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OCTOBER 1984 / $2.00

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

Integrity, Communication Are Keys to Condo Care

Charbonneau Board Likes Bizon's Aggressive Contracting

Dallorso is One-Man Show at Boston's Hitchin' Post

Oregon seed growers (from left) Jeff Kaser, Fred Kaser, Bob Riches, Dave Doerfler and Jack Riches.

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Circle No. 107 on Reader Inquiry Card

OCTOBER, 1984 VOLUME 23, NUMBER 10

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

20 Seed Report Says Buy Now

WT&T's annual look at the seed harvest shows some shortages apparent before spring. A detailed look at what to buy and when.

22 Communication Is Condo Care Key

Communication. Sounds simple enough. In the condominium maintenance field, though, it's not as easy as it sounds. Condo boards and red tape can provide the biggest stumbling blocks to successful communication and working relationships.

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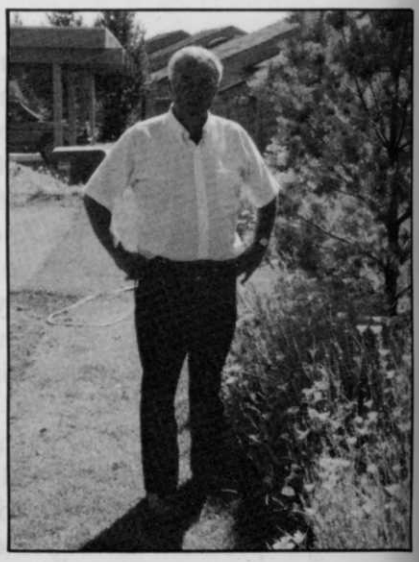
Steve Bizon takes pride in his work. One look at the care that goes into the landscaping at Charbonneau proves it. He expects the best for his clients—and himself.

28 One Man Show

It's not easy caring for the landscaping of a whole condo complex by yourself. But for one New England landscaping manager, the task is a lot easier with a little organization.

30 Sun River Is Condo Mecca

Sunriver, Oregon, is a little piece of heaven. With its multitude of recreational activities, condo starts are booming. Meet two men who care for two of Sunriver's most prestigious condo developments.



34 FERTILIZER GUIDE

This popular WT&T guide has been expanded this year. Richard Rathjens and Roger Funk outline fertilization requirements for turf, trees, containerized plants and interior foliage. A guide you'll want to keep.

Cover photo by Larry Kassell.

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by **Bruce F. Shank**, executive editor

Ford joins Deere in mower market

Ford Tractor told its dealers this fall it is entering the commercial mower market, starting delivery in January 1985 of a small line of walk-behind rotary mowers. Ford is the second major agricultural equipment manufacturer to enter the commercial mower market, following Deere's lead this year.

Deere and Ford have the advantage of considerably larger dealer networks than current turf equipment companies. Not all Ford or Deere dealers will carry the commercial mower lines, but the manufacturers predict serious participation by at least 200 to 500 dealers each, compared to less than 60 each for Toro, Jacobsen, and Ransomes.

Another trend involved is the private label manufacturing of walk-behind units by Bunton and Gilson for Deere and Ford respectively. The mowers are made to specifications set by Deere and Ford, but similarities with Bunton and Gilson's Sensation line are obvious. Deere makes its commercial riding mowers in its own plant in Horicon, WI.

Ford Manager of Equipment Marketing Plans Fran Engelhardt said Ford's new commercial line is a natural progression of its large lawn and garden tractors and its industrial tractor and flail mower lines. Ford's commercial mowers meet all consumer safety standards and feature simplified cutting height adjustment, floating deck which stays parallel to the surface, heavy duty bearings with xert fittings on key parts, and Briggs and Stratton IC engines.

Field days alter recommendations

Some turf maintenance customs are being challenged by the latest research findings displayed at turf field days this fall. Although it is important to remember these findings are specific to certain regions, they upset some standard practices in the industry.

Turf-type tall fescues outperformed red fescue and so-called shade tolerant Kentucky bluegrasses in a study shown during the Ohio State Turfgrass Research Field Day in Columbus in September. In addition to Olympic and Falcon turf-type tall fescues performing well in shade, Sabre *Poa trivialis* and Bristol and Touchdown Kentucky bluegrasses looked good. The surprise poor-looking grasses were Pennlawn red fescue and Glade and Baron Kentucky bluegrasses.

Turf fungicides and preemergent herbicides yet to be released by Ciba Geigy, O.M. Scott, Dow, and Du Pont will compete well with current products on the market. Growth regulators coming from Monsanto and Elanco looked very good on the Ohio State plots.

The treatment of Fusarium blight sydrome is being rethought. Research is supporting findings by Cornell Pathologist Richard Smiley that two or three pathogens are responsible for symptoms associated with Fusarium blight. Detweiler and Vargas at Michigan State University are advising, in addition to proper site preparation and mid-day irrigation of disease-prone areas, preventative fungicide treatments with Bayleton or Chipco 26019 or preventative and curative treatments with Tersan 1991, Fungo 50, or Cleary 3336.

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Circle No. 143 on Reader Inquiry Card

STEPS takes leap to calm pesticide furor

STEPS is off and running.

The Society to Educate Pesticide Safety, a group of six Ohio-based lawn care, pest control, tree care and chemical company professionals, is trying to nip in the bud the pesticide hysteria caused by what one member terms "environrads"— radical environmentalists.

The group is confronting the issue of public pesticide safety head-on in the hopes that clarifying issues and educating the public on the safe use of pesticides will drive away alleged scare tactics and anti-pesticide information being disseminated by certain special interest groups and "misinformed individuals."

"We are trying to get the truth out on what they (PCOs and LCOs) are really using and that this industry is already regulated enough," said George Gossett, an account manager with Dow Chemical and a member of the STEPS executive committee. He, along with Bob Holt of Davey Tree, Nate Robinson of Leisure Lawn, Ray Gibson of Ohio City Communications and the Professional Lawn Care Association of America and Lauren Lanphear of Forest City Tree Protection, hope to induce a groundswell of support in the state of Ohio to light the fire under other PCOs and LCOs so that individuals in other states will start similar groups.

STEPS members *meet to discuss strategy.*

STEPS' first order of business is educating the media on some of the misconception about chemicals.

Recently, the group hosted Dr. Carl C. Smith, professor of environmental health and pharmacology at the University of Cincinnati and a toxicologist at the Kettering Institute; Dr. George Fischer, head of the entomology department at the University of New Hampshire; and Dr. Wendell Mullison, a retired chemical researcher who holds of a number of 2,4-D process and formulation patents. He is currently a private consultant in the areas of agricultural pesticides with a specialty in herbicides.

The three scientists visited a number of Cleveland newspapers and radio stations last month dispelling myths about chemicals and their effects on humans and other animals.

STEPS, since its inception in August, has already attended many local city council meetings trying to answer citizens' questions and concerns about lawn care company spraying. Some northeast Ohio communities have entertained legislation trying to limit spraying.

"Sometimes they're willing to listen, other times we have a hard time even getting on the (council) agenda," Gossett told WT&T.

Lanphear, who is an arborist, says the lawn care industry should not be left fighting the battle alone.

"This problem, while this year may be targeted at lawn care companies, is an industry-wide problem. If lawn care gets regulated, it's only a matter of time before the other industries using pesticides are targeted for similar restrictions."

He emphasized the importance of other states addressing the problem *before* it gets to the panic stage and "stressing the benefits and safety of proper pesticide use."

Award Winner

WEEDS TREES & TURF Executive Editor Bruce Shank accepts a plaque from American Society of Business Press Editors' Vice President Bob Boggs at the recent ASBPE National Meeting in Boston. Shank accepted the award for the August, 1983 cover of WT&T which was a graphic representation of insect resistant turfgrass. The cover first won in the local Cleveland chapter and went on to compete nationally in Boston. ASBPE is an organization for professionals in the business and trade press fields.

TURF

Warren's axes Wisc. sod production

Warren's turf nursery will no longer grow sod at its Sullivan, WI, nursery.

"The decision to redeploy the significant assets in use in Wisconsin to other areas of the country is a corporate management decision aimed at maximizing return on investment of our stockholders," said General Manager Mike Holmes.

He said the Sullivan, WI, location is ideal for producing sod, but is well over 100 miles to the primary market of Chicago that it serves.

"This extra delivery cost put us at a significant cost disadvantage as compared to several good competitors in the very price-competitive Chicago market."

Holmes said even though seedings have stopped, a good supply of bluegrass sod should be available through July-August 1985.

Warren's plans to continue marketing its proprietary line of turfgrass seed through its dealer/distributor network in Wisconsin and Illinois.

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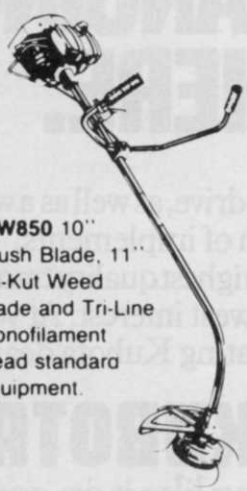

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Circle No. 114 on Reader Inquiry Card

ACQUISITION

Seats Inc. buys Columbia Car Corp.

Columbia Car Corporation, producer of electric and gas golf cars, has been acquired by Seats, Incorporated, and will now be known as Columbia Par-Car Corp.

The newly-created corporation will operate as a wholly-owned subsidiary of Seats, Incorporated, Reedsburg, WI.

W.R. Sauey, chairman of Seats, Incorporated, said, "We will continue in the tradition of manufacturing quality and efficient golf cars under the Columbia name. We have an enthusiastic group of operating and managerial personnel, along with an effective dealer organization. Our plan is to provide strong support to our current dealers so vital to this industry. Special emphasis will be placed on establishing a dealer network throughout the United States that supports the sales and service capabilities now in place."

Seats, Inc. will inject Columbia with capital and manufacturing and marketing skills. Said Sauey,

"It is our initial plan to restructure the operating and marketing functions into a lean and effective group that is the history of 37 years in the manufacturing of varied industrial and consumer products."

Seats Incorporated is a manufacturer of heavy duty seating for trucking, off-highway and recreational vehicles.

CHEMICALS

Diquat cleared of EDB hazard charges

After a three month study, three Flordia state departments and two independent laboratories have determined that ethylene dibromide (EDB) levels in Ortho Diquat Herbicide H/A used in non-potable waters do not pose a significant envirnomental danger or human health hazard.

As a result, the Florida Department of Natural Resources has rescinded its March 1 requests to discontinue use of all Diquat products and to suspend future issuing of permits for using Diquat.

Beginning in March, the Department of Natural Resources, the Department of Agriculture and Consumer Services and the Department of Environmental Regulation began to monitor field test sites and Diquat containers for hazardous EDB levels.

An analysis of samples taken from

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these sites lead to the conclusion that EDB levels in Diquat used in non-potable water are not a significant threat to human health or the environment.

Florida aquatic herbicide permit holders will now be allowed to use Diquat in non-potable waters at rates which do not exceed two gallons per acre. Applicators denied a Diquat use permit during the 90 day study may now reapply for a use permit through their regional biologist. Those already holding a use permit may continue using Diquat under the guidelines of the use permit and the product label.

SEED

Jacklin builds seed warehouse in Idaho

The Jacklin Seed Company's Nezperce, ID, facility sports a new 22,500-sq-ft, steel and concrete warehouse finished late this summer. "The new building will help provide warehousing for seed to be marketed throughout the world," Duane Jacklin, general manager, said.

Jacklin Seed, Post Falls, ID, has marketing arrangements with a number of European counties, several Asian nations, Australia, New Zealand, Canada, plus countries in South America, Central America, and the Middle East.

Future plans call for a two-story, 3600-sq-ft office facility inside the new warehouse, and the addition of a mill line for seed conditioning.

"It is our intention to work closely with our Pacific Northwest producers to help make grass seed production as profitable as possible," Jacklin noted. "We're exploring markets in every corner of the world to help make that happen."

TURFGRASS

Two Lofts ryegrasses get PVP certificates

Palmer and Prelude turf-type perennial ryegrass varieties, developed jointly by Lofts and Rutgers University's New Jersey Agricultural Experiment Station, recently received Plant Variety Protection (PVP) certificates. Each of these varieties has been on the market for only one year.

Lofts claims both varieties display improved mowability, tolerance to drought and heat, dark green color, good winter hardiness, improved resistance to crown rust and brown patch, and fine-leafed, dense growth.

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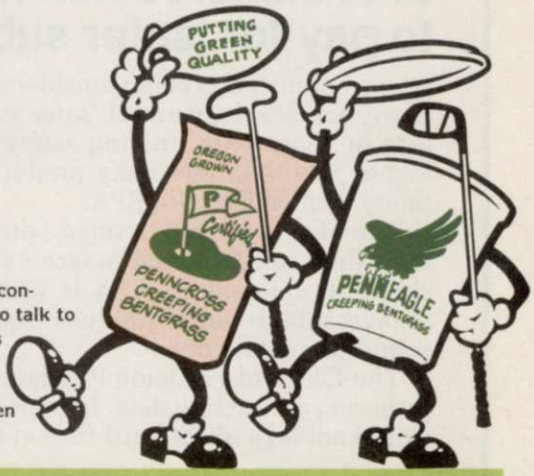

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Circle No. 137 on Reader Inquiry Card

UPDATE

Applicator in '86 may have to wear both gloves and respirator

EPA will release this spring proposed Worker Protection Standards for pesticide applicators which include gloves and respirators as required protective clothing. The proposals will face hearings before they are enacted sometime in 1986.

The scope of pesticide applicators has been broadened to include greenhouse, golf course, and other non-agricultural areas, as well as those who mix, load, apply or handle pesticides. The proposals stress the need for protection upon reentry of a treated area and include provisions on posting and other warnings.

Panel zeroes in on 'inadequacies' of pesticide applicator supervision

An EPA Administrator's Pesticide Advisory Committee discussed last month the lack of adequate supervision of uncertified applicators of restricted-use pesticides. The committee, discussing possible amendments to FIFRA, implied changes to the meaning of direct supervision and improvement of applicator training were possible in future regulations.

An early victory of commercial and agricultural applicators was the acceptance by EPA of direct supervision by telephone. In this way, an uncertified applicator has been able to apply restricted-use pesticides as long as he can reach a certified applicator by phone. The panel seems to be leaning toward either requiring all applicators of restricted-use pesticides be certified or narrowing the meaning of direct supervision.

Pesticide applicator training is also be studied by the panel for changes. A training requirement for uncertified applicators may provide room for compromise with the all certified applicator proposal.

EPA explores risk fees to pay for 'safer substitutes'

A 'per-pound fee' is being considered by an EPA advisory panel to pay for development of 'safer substitutes'. High-risk products or those with missing safety data would be charged a higher rate than less risky products or those with complete safety data on file with EPA.

The idea is already termed "dramatic" by panel members and others and is bound to face extreme counter-pressure by chemical companies. EPA is trying to make it financially unfavorable to either produce higher risk products or delay submitting safety data.

The Office of Pesticide Programs has set 1985 as a goal for gathering all missing data. Implementation of such a proposal would not take effect until 1986 at the soonest.

INDUSTRY

Amfac sells units to Tri-West Inc.

An employee group headed by John F. Mendez, former executive vice president at Amfac, purchased all the assets of Amfac's three horticulture units this summer. The new company, known as Tri-West Inc., is based in San Mateo, CA. Terms of the sale were not disclosed.

Involved in the sale were Amfac Garden Perry's, a ground cover and bedding producer, Amfac Garden Cal-Turf, and Jenco Nurseries, a horticulture wholesaler in the Southwest. Combined revenues for the units in 1983 were $25 million.

Amfac will use the proceeds from the sale, which were substantially in cash, to reduce its short-term borrowings.

Amfac spokesperson Gwenly Carrel said the decision to sell the horticulture units was made in January after an exhaustive reevaluation of the entire company. She said it was Amfac's goal to divest itself of businesses "that have shown losses or low returns in recent years. Horticulture was one of the areas we identified as not meeting our goals."

Depressed housing starts during 1981 and 1982, resulting in poorer performances than anticipated in the nursery business, figured into the decision to sell, she told WEEDS TREES & TURF, along with the belief that some of Amfac's smaller businesses were not "conducive to effective corporate management."

PEOPLE

Names in the news

A new group of leaders head the American Association of Nurserymen (AAN) following that organization's recent convention in San Antonio, TX. **Lawrence W. Bachman**, takes over as president of the AAN. He goes back a long way in the Green Industry. In 1938 he began the landscaping and garden store divisions of Bachman's, a Minneapolis firm which now has five garden centers and two nursery/landscape outlets. Bachman's celebrates its 100th anniversary in 1985.

The new AAN president is the former director of AAN's Region IV and was elected to the AAN board of directors in 1979 (serving as vice president in 1983). Replacing Bachman as director of Region IV is **Steve Driftmeier**, president of Wilmore Nurseries, Inc., Wheat Ridge, CO, and Little Valley Wholesale Nursery, Brighton, CO.

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Circle No. 116 on Reader Inquiry Card

Shortages of proprietary Kentucky bluegrasses, bentgrasses, and turf-type tall fescues are very likely this coming spring.

Don't Wait for Spring To Buy Turf Seed

by Bruce F. Shank, executive editor

A familiar sight *in Oregon seed country—windrowing fine fescue.*

Buy enough seed to meet your needs through next summer and store it, advise seed company representatives following this summer's harvest. Local shortages of proprietary Kentucky bluegrass, bentgrass, and turf-type tall fescue seed are very likely.

Kentucky bluegrass

You might be wondering how Kentucky bluegrass could go from an oversupply the past two years to a potential shortage of nearly all proprietary varieties in one harvest.

The people who are closest to the bluegrass situation are the Jacklin brothers, located in the midst of Kentucky bluegrass production in eastern Washington, western Idaho, and northern Oregon.

"The poor burns from last fall are the primary reason," explains Doyle Jacklin of Jacklin Seed, Post Falls, ID. "We anticipated crops would be down 40 percent, but it turned out to be more like 70 percent.

Jacklin said ergot contributed to 10 to 15 percent of that reduction.

"The burns were good this year, though, and '85 should be a good year unless we get a real hot June which is when pollination occurs."

Last fall, seed producers knew the Kentucky bluegrass seed yield would be relatively poor, but they felt the overstock in their warehouses would easily cover them.

The surpluses built up during the recession caused the price of proprietary Kentucky bluegrasses to fall. As a result, it was less favorable to produce, and farmers started plowing under bluegrass fields for more profitable crops in 1983.

Rains during the harvest season of 1983 made it very difficult to burn the stubble off the fields following combining. "Poor burns hurt a process called vernalization which has a great impact on the amount of seed an individual plant produces," explains Bob Peterson of E.F. Burlingham.

"Although new Kentucky bluegrass plantings were down because of the surplus," says Jay Glatt with Turf Seed Inc., "fields planted in 1983 were not affected by bad burns. As a result, some of the newest proprietary bluegrasses with expanding production were not hurt by bad burns." Midnight and Nassau were two new Kentucky bluegrasses mentioned as saved during interviews. Adelphi and Glade were already sold out to distributors by September. Steve Tubbs at Turf Merchants said supplies of Fylking and Merit should still be adequate.

Good news turned into bad when orders from sod growers started pouring in last fall and this spring. The overstock started shrinking rapidly. "Any named bluegrass will be relatively short until 1985," says Larry Vetter of Northrup King.

A hail storm in northern Minnesota knocked the Park Kentucky bluegrass crop down a third, according to Vetter. "Common Kentucky bluegrass is probably down 25% overall this year."

Tall fescues

Improved turf-type tall fescues are short mainly because production has not built up to demand. "There is a continuing increase in use and consumption of turf-type tall fescues, even in Canada," Pickseed's Kent Wiley points out. "We have not had rain in more than 60 days. The lawn around out office is tan and dormant, except for our tall fescue plots which remain green and attractive. Most seed companies have already sold their entire tall fescue production for this year to seed distributors."

Tubbs at Turf Merchants says that

SEED HARVEST STATUS*, LISTED BY PROPRIETARY AND COMPANY NAMES

*A indicates possible surplus; B indicates adequate supply; C indicates supply limited.

KENTUCKY BLUEGRASSES

Adelphi	Adikes, Jacklin, NK	B
America	Pickseed	C
Aquila	Northrup King	C
Arboretum	Mangelsdorf	B
Banff	Pickseed	C
Baron	Lofts	B
Bayside	Jacklin	C
Bonnieblue	Burlingham	C
Bristol	Scott	B
Challenger	Turf Seed	C
Cheri	Jacklin	C
Columbia	Turf Seed	B/C
Eclipse	Jacklin, others	C
Enmundi	Seed Research	C
Fylking	Jacklin	A
Georgetown	Lofts	C
Geronimo	Jacklin	C
Glade	Jacklin	C
Haga	Jacklin	C
Majestic	Burlingham	C
Merion	Merion Assoc.	B
Merit	Full Circle	B
Midnight	Turf Seed	B
Monopoly	Pioneer Hi-Bred	B
Mystic	Lofts	C
Newport		
Nassau	Jacklin/Lofts	B
Nugget	Jacklin	A
Parade	Northrup King	B/C
Park	Northrup King	B
Plush	FFR Corp.	C
Ram I	Jacklin/Lofts	C
Rugby	Northrup King	B/C
Scenic	International	C
Sydsport	Burlingham	C
Touchdown	Pickseed	C
Vantage	Scott, International	B
Victa	Scott	B
Wabash		
Warren's A-34	Warrens	C

PERENNIAL RYEGRASSES

Agree-Intermediate	Lofts	C
All Star	Adikes, Jacklin	A
Barry	Turf Merchants	B
Belle	Burlingham	C
Birdie II	Turf Seed	B
Blazer	Pickseed	B
Caravelle	Scott	B
Citation	Turf Seed	B
Citation II	Turf Seed	C
Cowboy	Lofts	B
Dasher	Pickseed	B
Derby	International	B
Delray	Northrup King	B
Diplomat	Lofts	C
Elka	International	C
Eton	Northrup King	B
Fiesta	Pickseed	B
Gator	International	C
Goalie	Northrup King	B
Jackpot	Jacklin	C
Linn		A
Loretta	Scott	B
Manhattan II	Turf Seed	B
NK200	Northrup King	C
Omega	Turf Seed	B
Omega II	Turf Seed	C
Palmer	Lofts	A
Pennfine	SPIC	A
Pennant	Burlingham	B
Prelude	Lofts	A
Premier	Normarc, Seed Research	B
Regal	International	B
Repell	Lofts	C
Tara	Hubbard Seed	C
YorktownII	Lofts	B

CREEPING RED FESCUE

Dawson	Northrup King	B
Ensylva	International	B
Flyer	Turf Seed	C
Ruby	Northrup King	B
Fortress	Turf Seed	C

CHEWINGS FESCUE

Agram	Pickseed	B
Atlanta	Northrup King	A
Banner	Scott	B
Highlight	International	B
Jamestown	Lofts	B
Koket	Burlingham	B
Shadow	Turf Seed	B
Waldorf	Pioneer Hi-Bred	B

TALL FESCUES

Adventure	Warrens	C
Alta		A
Apache	Turf Seed	C
Astro	Green Seed Co.	C
Bonanza	Cenex	C
Brookston	Turf Merchants	C
Clemfine	Lofts	B
Falcon	Burlingham	C
Finelawn 1	Fine Lawn Research	B
Galway	Northrup King	C
Houndog	International	C
Jaguar	Garfield Williamson	B
K-31		A
Marathon	Hubbard Seed	C
Maverick	Pickseed	C
Mojave	Mid-Valley	C
Mustang	Pickseed	B
Olympic	Turf Seed	B
Rebel	Lofts	B
Tempo	Normarc	C
Willamette	Willamette Seed	C

HARD FESCUES

Aurora	Turf Seed	B
Biljart	Scott	A
Reliant	Lofts	B
Scaldis	Northrup King	B
Tournament	Pickseed	B
Waldina	Turf Seed	B

BENTGRASSES

Bardot Colonial	Lofts	C
Emerald	International Seeds	C
Exeter Colonial	Pickseed	B
Highland	Highland Com.	C
Penncross	Tee-2-Green	B/C
Penneagle	Tee-2-Green	B/C
Prominent	Seed Research Inc.	B

OTHER

Azay Sheep Fescue	Pickseed	B
Beaumont Meadow Fescue	Lofts	C
Fults, Puc. distans	Lofts	B
Sabre, Poa trivialis	Int'l Seed	C

WINTER OVERSEEDING MIXTURES

CBS	Turf Seed	B
Dixie Green	International	B
Futura Plus	Pickseed	B
Marvelgreen	Lofts	B
Medalist	Northrup King	B
PhD.	International	B

buyers are willing to pay three times more for improved turf-type tall fescue than K-31.

Bentgrasses

A poor bentgrass seed crop in 1983 caused serious local shortages. Penncross and Penneagle were hit hard. Tee-2-Green offered a bentgrass blend called Pennway to solve emergencies until the '84 crop came in. Seed companies started promoting other proprietary bentgrasses such as Prominent and Emerald to golf superintendents.

"Bentgrass growers are getting above average yields," says Glatt. Tee-2-Green started filling backorders on August 15 as promised in a promotional campaign this past spring. "There will be no surplus this year," Glatt said.

Fine fescues

Growers of fine fescue are being hit from both sides according to Dave Nelson of the Oregon Fine Fescue Commission. Bad burns have lowered their yields while the export market, a major user of fine fescue, has dried up because of an unfavorable exchange rate caused by the strong U.S. dollar.

"The farmer is getting less than 30 cents per pound for fine fescue, the lowest it has been in years," says Bob Riches, a fescue grower in Silverton, OR. "We also face competition from Canada creeper imported into the U.S."

Perennial ryegrass

Better than average perennial ryegrass crops are being attributed to new varieties of perennial ryegrass with increased rust resistance and new fungicides used by seed growers.

Concentration on better yielding varieties and rust resistance by researchers is paying dividends as long as rain doesn't hamper harvest. Pennfine is approaching surplus quantities whereas the supply of most new perennials will be adequate. Second and third generation perennial ryegrasses are now increasing in production.

Some growers infer that perennial ryegrasses are reaching the status of Kentucky bluegrasses with too many varieties and a good supply of each. They feel the same thing might happen to the turf-type tall fescue market as more companies enter the market.

Bottom line, according to Bob Peterson is, "By spring, you may not find what you want. Buy now." **WT&T**

LANDSCAPE MANAGEMENT

Condominium and apartment maintenance managers have found the key to a successful working relationship is as old as the hills—keep the lines of communication open. In the rapidly growing condominium field, it is an integral ingredient.

A Simple Formula

by Maureen Hrehocik, managing editor

There are no secret formulas for facility managers for having a good professional working relationship with condominium association boards. The formula is simple—communicate with each other.

That's the feeling of most of the respondents in an informal WEEDS TREES & TURF market survey among condo, apartment, and resort maintenance and management personnel. Most respondents were employed by condo associations and care for, on the average, 132.6 units.

"It's important to identify the key players (on a board) early in negotiations," explains one manager. "Some members are vocal, but may have little direct relation to decision-making."

Another suggested that a detailed explanation of the work to be performed be given *in advance* of the maintenance agreement.

One manager took that one step further—have a written, specific contract and have all board members sent a copy of the contract, and where possible, a copy to every unit owner. They, in turn, should give a monthly written evaluation of the work being done.

Of those surveyed, three-quarters felt communication was their greatest ally.

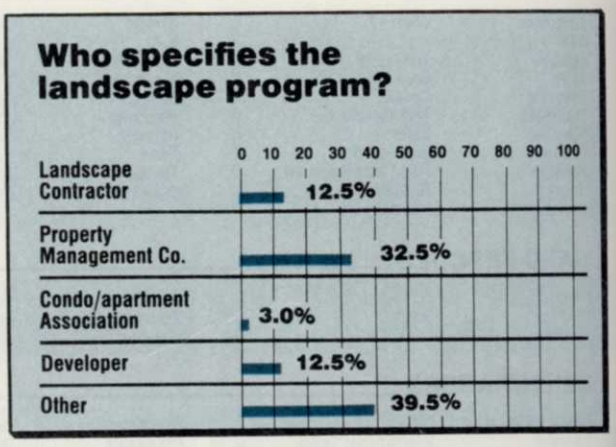
Major complaints among respondents include finding qualified help, and on the other side of the coin, working for owners and boards who have no concept of landscaping and what it takes to keep the grounds the way they'd like them.

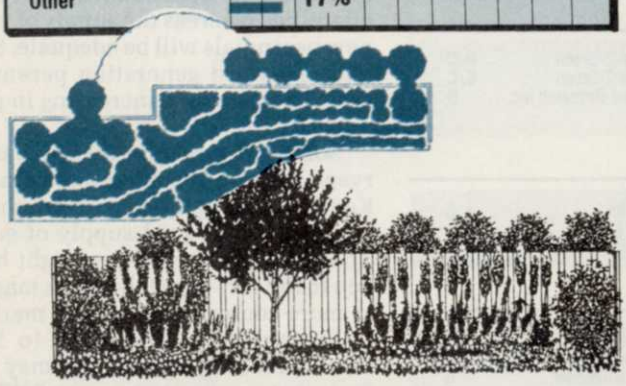
The quality of today's labor force, inexperienced staffers not paying attention to detail, and constant turnover of labor were all cited as trouble spots.

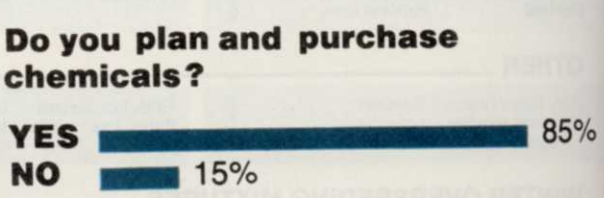
Another sore spot is integrity.

Says one manager, "Our largest problem is loosing large contracts to other contractors who we know are performing inferior work and not following specifications. Often cheaper chemicals or less quantity are used which may make a substantial difference in price. We hesitate to call this to the attention of the client though, since it would appear like sour grapes, and certainly unprofessional. We frequently find that purchasing agents or condo associations are not qualified technically to recognize the difference."

continued on page 70







*Those surveyed were responsible for an average of 132.6 condominium and/or apartment landscapes.

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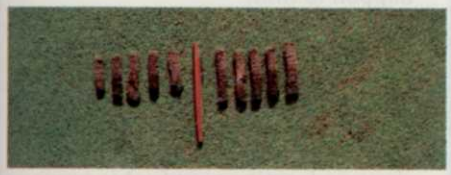
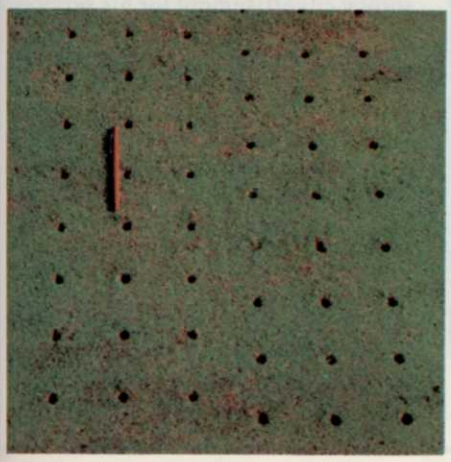
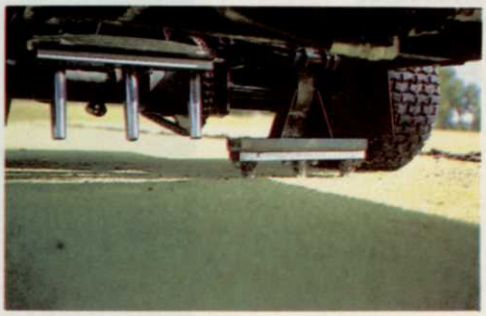




decreases surface runoff and irrigation frequency. It also breaks up thatch and compaction and brings up soil particles to reinoculate thatch with soil and microbes to enhance thatch decomposition. The Ride-Aire breaths new life into thick lawns and helps prevent the "5-year slump" in turf quality that causes customer dissatisfaction and turn-over. Whether regular turf maintenance or renovation, the new Ride-Aire adds a new dimension to the lawn care service industry.



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LANDSCAPE MANAGEMENT

Making Heads Turn

Steve Bizon is an aggressive 28-year-old who knows it takes innovation, commitment and new ideas to make a fledgling maintenance company a winner. The condos at Charbonneau are a testament to the kind of service Bizon delivers.

by Ron Hall, assistant editor

Aerial view of Charbonneau condominium *complex in Oregon. Photos by Larry Kassell.*

Steve Bizon *behind the Toro tee mower he modified to a walk-behind.*

When complaints start zinging around the room during a meeting of a condominium board they can often pierce the hide of even the toughest maintenance contractor.

Steve Bizon, the 28-year-old owner of Bizon Maintenance Company near Portland, OR, tries to blunt the barbs with a simple formula; and although his ideas have yet to stand the test of time (he's been in business just five years), he's off to an encouraging start.

"Some of the other maintenance companies are already starting to copy some of the things we do," Bizon claims.

Young and aggressive, he attacks potential problems before they get to the gripe stage, then he makes sure word gets back to where it counts—to the condominium board, a philosophy that has worked beautifully in the 1½ years his company has held the maintenance contract for one section of the classy Charbonneau condominium complex on the banks of the Willamette.

Charbonneau, just outside of Portland, is practically a community unto itself, a 600 acre, 764-unit complex with an 18-hole golf course, tennis courts, swimming pools, and shopping center.

Bizon holds the maintenance contract for the Charbonneau Greens Town Home section of Charbonneau, with 49 units, the smallest of the the three associations.

As small as it is, it's not without a bite.

It gave the previous maintenance contractor the heave ho.

Bizon is determined not to let that happen to him.

All important image

Charbonneau, even though condominiums make up just 20 percent of his business (the remaining 80 percent is strictly commercial), is a showy advertisement for his services, Bizon feels.

Also, he makes no secret he's eyeing the contracts from the other associations at Charbonneau, quite a plum considering the size and the variety of maintenance tasks in this community which was begun in the early 1960s.

"When we take a job we agree to provide all the maintenance from the front door to the property line. That includes the parking lot, the sidewalks, just about everything," Bizon says.

Charbonneau is his type of account. It has class, just the image he

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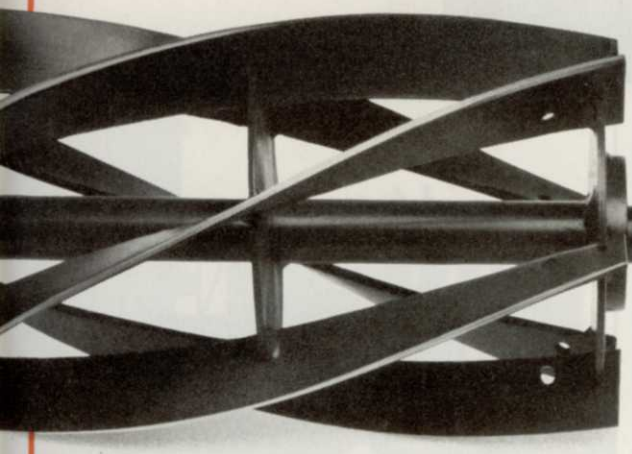

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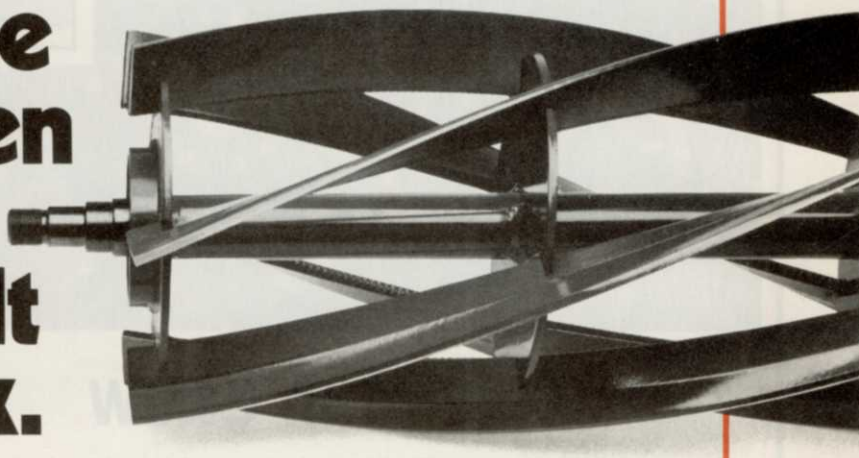

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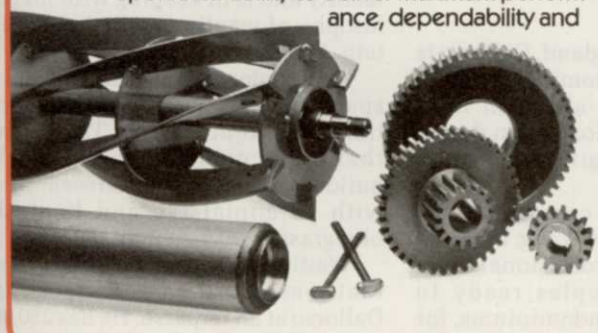
So, whether you're buying gears, bedknives, wheels, filters or any replacement part for Jacobsen equipment, remember the difference. Some parts are built to fit. Jacobsen parts are built to work... beautifully.



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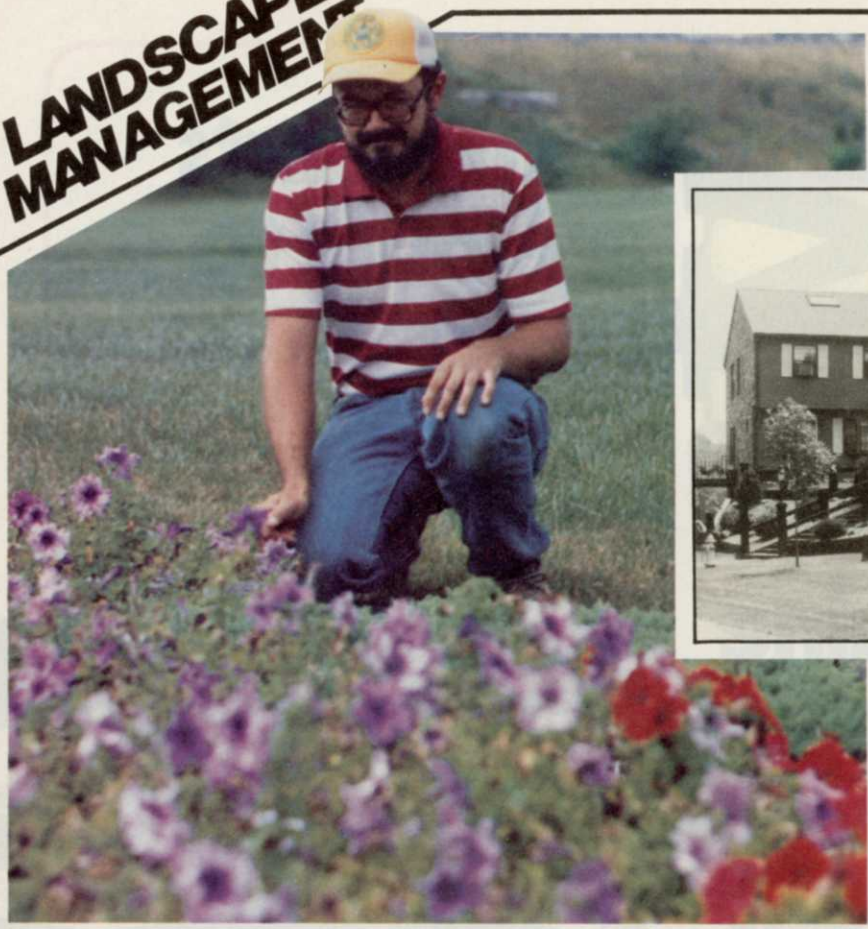

Shown above, the Hitchin' Post *condominiums, North Chelmsford, MA. At left, Joe Dallorso favors petunias for their hardiness and vivid color.*

One Man Show

Organization is Joe Dallorso's best friend to help him manage the grounds and buildings at the Hitchin' Post, a condo development in a rapidly growing condo area on the outskirts of Boston.

by Maureen Hrehocik, managing editor

Being a one-man maintenance crew can have its advantages and disadvantages.

For Joe Dallorso, maintenance manager at the Hitchin' Post condos in North Chelmsford, MA, his Lone Ranger status lets one of his strongest attributes shine through—organization.

Dallorso's small but neat office on the grounds of the 77-unit complex hints at his business style—books organized by heighth on shelves; screws, nuts and bolts in neat organizers, log books kept with a month to month, week to week schedule of fertilizing.

"Being a one person staff I *have* to be organized," explains Dallorso. "I also have to know what I can get away with *not* doing because there are only so many hours in a day."

Besides the grounds, Dallorso also does building repair and maintenance which takes up about 20 percent of his time, takes care of a swimming pool and a tennis court.

Condo hotseat

In his area of New England, Dallorso is in the hotseat of condominium development. In his area about an hour north of Boston, condominium developments are springing up everywhere.

Many high tech companies are locating there, such as Wang, bringing with them single professionals and newly-married couples ready to invest in a home. Condominiums, for a variety of reasons, are the obvious choice.

"Our Route 128 here is to North Chelmsford what the Silicon Valley is to California," says the 29-year-old.

Dallorso estimates that there are over a dozen condo developments in a five mile radius to the Hitchin' Post.

"Condominiums are the overall trend in New England," Dallorso says. "And sales of these condos ultimately comes down to how the property is maintained. It adds tremendously to resale value which potential consumers are concerned with."

Since he has been at the development for the past three years, Dallorso's plan of attack has been a slow, systematic upgrading of the facility and is in keeping with his philosophy of wanting not only to maintain, but improve the grounds.

"My major battle was and still is sparse grass," he admits. Dallorso inherited Kentucky 31 Tall Fescue that was custom blended by the builder. He has since overseeded that with perennial rye and Kentucky bluegrass.

Waiting on a new sprinkler system that was installed in August had Dallorso at an impasse. He has 250,000 square feet of turf to keep lush and green. With the area's sandy soil and

poor drainage, that was rather hard to do.

"I had reached a point where there really wasn't anything I could do without a new system."

And before getting that, he had to convince the three trustees of the condominium board that assessing each unit owner $400 was in the best future interest of their property. When put to a vote, the measure passed with an 85 percent majority and only minimal grumbling.

He says he has no real problems with his $60,000 a year maintenance budget and that within reason, all his requests are usually granted.

Time for growth

With the new sprinkling system, he can now progress to a new level of maintenance; adding more flowers and making other site improvements. Along split rail fences, he has added roses and other flowering plants. Along the fronts of the condominium's he has planted various colors of petunias because of their hardiness.

One of his first orders of business was getting the turf away from underneath shrubs and mulching around them instead. He planted about 1800 annuals around the buildings and 1200 tulips and daffodils to add color. Each resident was assessed $12 and couldn't have been happier with the results.

Right now, Dallorso gets by with one 18 hp Mitsubishi Beaver III tractor. For it he has a rear-mounted, PTO-driven Woods RM48. The front end loader is a Johnson's Black Hawk No. 25. His Vandermolen fertilizer spreader doubles as a sand spreader in the winter.

He hopes with the increased level of maintenance, he can round out his machinery to give him varying and more precise cutting options.

In August, Dallorso was battling Japanese beetles with Sevin. He also has an ongoing battle with grubs (which he treats with Diazinon) and treats chinch bugs with Dursban. He uses Scotts ProTurf fertilizer. Roundup is used extensively for weed control and Surflan for preemergent control.

Dallorso feels he is lucky because he has such a good working relationship with the trustees he reports to.

"Personality-wise we're very much the same," he says, "and that's important. We have no adversarial relationship."

To keep them abreast of Dallorso's activities, he gives them a weekly written progress report.

Things are looking so good that Dallorso is eyeing his own maintenance company and hopes to keep the Hitchin' Post as a client.

Professionalism is very important to Dallorso and he has strong feelings about it.

"It seems as though most people don't respect as a professional, someone who uses their hands in their jobs," he explained. "Just because I do manual labor doesn't mean I'm not a professional."

Dallorso had been studying prelaw until he started "to go insane under neon lights." He had always liked gardening and let his interests steer him in that direction. He became an apprentice laborer and learned about landscaping. He has been in the business ever since. **WT&T**

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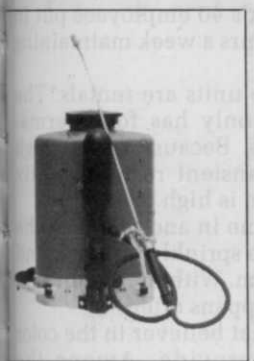

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LANDSCAPE MANAGEMENT

Condos in Sunriver: Oregon's Recreational Mecca Braces for Major Growth

Nestled in the shadow of the Three Sisters mountain range and the inviting ski slopes of Mt. Bachelor, are Quelah and Alberello. The two posh condominium complexes in the Sunriver resort area are harbingers of only the beginning of a boom in growth for this central Oregon area.

by Maureen Hrehocik, managing editor

Oregon is quickly changing from a lumber capitol to a recreation mecca. More and more condos will be built to accommodate the increasing influx of tourists.

Marvin Mix, in charge of landscape maintenance at Quelah, and Mike Dawkins, his counterpart at Alberello, both predict that the Sunriver area will explode in growth within the next few years.

"It's really the only growth going on in Central Oregon," says Mix.

A road has been completed from Sunriver that cuts about 45 minutes traveling time off getting to Mt. Bachelor, one of the premiere skiing mountains in the Northwest. It has opened the floodgates for skiers. The entire Sunriver area boasts about any sport you could be interested in—golf, tennis, rafting, canoeing, horseback riding and hiking.

Both Mix and Dawkins share some of the same landscape concerns. Both Quelah and Alberello are relatively new developments (especially Alberello).

They both have growing pains. Couple that with the extreme weather fluctuations of Central Oregon and you have one of the more challenging landscape situations in the country.

Quelah

Marvin Mix got the maintenance contract to the 15-acre Quelah complex only a year ago.

He inherited a headache.

Mix is the owner of Marvin's Gardens, a private firm specializing in large, commercial landscaping projects. He also has a retail garden center and landscape architects and construction crews available to clients who would like them. Marvin Gardens has also branched out into interiorscaping.

Landscaping, maintenance and the nursery each make up about 1/3 of his business. Mix also has the maintenance contract to Tennis Village, another Sunriver complex.

Quelah is a six-year-old, 92-unit complex. The last phase was completed a year-and-a-half ago, with an additional two phases planned.

Mix's biggest initial challenge at Quelah was the irrigation system. It was badly maintained with most of the lines lying bare on top of the dirt. The systems in all four phases were different.

"We redid the whole system," says Mix. "We had one good system out of those four."

Mix's next order of business was to plant $10,000 worth of shrubs once the irrigation work was done.

Tricky weather

The weather provides a real challenge for landscapers in Central Oregon. Thirty-one degree nights in August are nothing out of the ordinary.

More often than not, we have a freeze every month of the year," explains Mix. "September is the first freeze and by November we have snow."

The snow can last until April. Ice damage on turf can be high. Mix's growing season is from April to October.

Quelah's lawns are fertilized four times a year. The soil is a sandy pumice that leaches nutrients readily. Mix uses a 12-12-12 fertilizing mixture.

"If I need a quick green-up I add ammonium nitrate."

Mowing on the combination bluegrass perennial rye lawns is done every week with Toro and Honda mowers.

Two of Mix's 40 employees put in about 10-12 hours a week maintaining Quelah.

Most of the units are rentals. The development only has four permanent residents. Because of the high number of transient residents, Mix says vandalism is high.

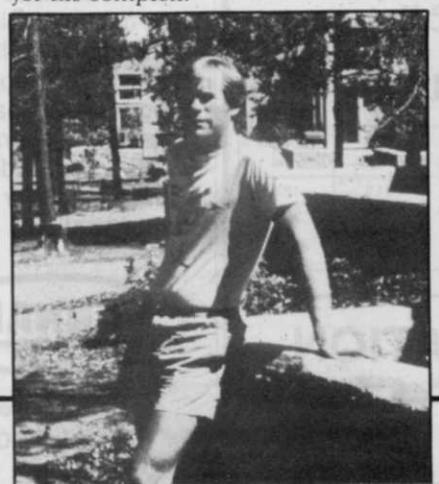
"People come in and fool with the controls on the sprinkler systems and try to reset them. With the turnover in guests, this happens often."

Mix is a great believer in the color flowers can provide. Among the native kinnkinnick groundcover, he uses perennials and wildflowers.

"I like staying with natural, indigenous plants," reports Mix. He has more perennials included in his 1985 landscaping plan.

"This year I'm just trying to get everything greened-up and up to a respectable level. Next year, we'll

Mike Dawkins, *landscape manager at Alberello, is a strong proponent of native plants and drip irrigation for his complex.*



Residents of Quelah *get a spectacular view of Mt. Bachelor and the surrounding Sunriver resort area.*

Native poppies *provide color in Marvin Mix's landscape plan for Quelah.*

start refining things."

Alberello

Don't mention the word "bark" to Mike Dawkins.

The landscape maintenance manager at the brand new Alberello condos will grimace.

"You mention low maintenance and native landscaping and most contractors (around here) think of junipers and bark."

Not Mike Dawkins.

He is a firm believer that native doesn't have to be synonymous with stark. Native flowers and shrubs are an integral part of his landscape designs. Using drip irrigation is also high on the list of priorities.

Dawkins, 38, is one of three partners in Cascade Garden Center. The company has 30 clients, mainly residential. Most are landscape design clients, not maintenance. In fact, the barely year-old Alberello is his only townhouse/condo maintenance contract. Only 10 of its 26 units are completed. The rest are currently being built. Alberello has two permanent residents. Most units are vacation homes; the others vacation rentals. Units start at $145,000.

Each unit has its own courtyard which is completely irrigated.

Dawkins can't say enough about drip irrigation. He uses Microjets which are most widely used in citrus grove irrigation.

"The way the water is put out, it's just like a slow, soaking rain," explains Dawkins, "and it usually costs about 1/4 of what traditional systems cost to run. That leaves me more money for plants."

Dawkins also likes the ease of installing drip systems.

"I think cost and ignorance are the main reasons why more people don't use it (drip)."

Dawkins used Fortress fine fescue in the area between the residences and the golf course onto which Alberello abutts.

"It's a low maintenance grass that blends well into the rough of the golf course," he says.

Chipmunks are a major problem at Alberello and Quelah. Situated in the Deschutes National Forest, the area is full of them. They find Dawkins' succulent plants a particular treat.

"They're a real problem and we have to design what we plant around the critters."

Like Mix, lack of a growing season is also a problem for Dawkins.

He uses a lot of native kinnkinnick groundcover to "cement" the earth. Potentilla, another native flowering deciduous shrub, is used extensively. Beds of daffodils and rambling roses are also used for color.

An alpine garden is in the works for a slope on one side of the tennis courts. Three hundred plants from as far away as South Africa, Asia and the Himalayas, will provide a stunning focal point on the slope facing the entrance to the complex.

"The different types of plants will provide different color breaks and will extend the blooming season. The alpine plants will also keep with the natural setting of the woods and rocks."

Penstemmons, saponaria, phlox, campanula, sedum and saxifraga will be part of the garden.

Dawkins, a bird lover, said he plants a lot of berry-bearing bushes such as choke cherries, beech plum, vibernum and manzanita.

Dawkins has been a full-time landscaper since age 17. He grew up on a golf course surrounded by a housing development his father owned. He did the landscaping there and his career as a professional landscaper was launched.

He majored in biology with an emphasis in botany at Southern Oregon State. He's lived in the Sunriver area seven years.

He did the landscaping there and his career as a professional landscaper was launched.

Dawkins and his partners are optimistic about the area's growth. Business has been so good, Cascade Gardens usually will not maintain a development it didn't design. **WT&T**

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Because Rubigan is a very active, concentrated fungicide with long-lasting residual action (up to 28 days on dollar spot), it allows longer intervals between sprayings. So you can reduce application trips, save on fuel and labor. Lower use rates also mean less storage and lower handling costs.

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1984 Guide to Turf, Tree and Ornamental Fertilization

by Richard Rathjens, Ph.D., and Roger Funk, Ph.D., Davey Tree and Lawnscape companies, Kent, OH

Plants require at least 16 elements for proper growth and development. Three of the elements—carbon, hydrogen and oxygen—are provided by air and water; the other essential elements are obtained from the soil.

The **macronutrients**, nitrogen, phosphorus and potassium, are often called the primary nutrients because of the amount used by the plants and their importance in supplemental fertilizers. Magnesium is also considered a macronutrient.

The **micronutrients**, iron, manganese, copper, zinc, boron, molybdenum and chlorine, are required in smaller quantities but are no less important. Because of reserves normally found in soil, the addition of supplemental micronutrients is not often necessary unless the soil is excessively alkaline or sandy.

FERTILIZERS

Fertilizer is any material that supplements the soil's supply of elements required for plant growth and development. Fertilizers may be categorized as natural organic, synthetic organic or inorganic based on their source and chemical structure.

Organic fertilizer consists of nutrient elements derived from compounds with a carbon structure. All living matter—plant or animal—is composed of compounds with a carbon structure. Compounds synthesized by organisms have one common factor—a carbon structure. Any of these materials could be considered as organic fertilizers

Common examples of **natural organic** fertilizers are animal manure, bonemeal, sewage sludge and plant refuse. Scientists have synthesized compounds with a carbon structure which are also organic. Examples of **synthetic organic** fertilizers are ureaformaldehyde and isobutylidene diurea.

Urea is technically an organic fertilizer since it contains one carbon. It is both naturally (bird manure) or synthetically produced. Although technically organic, it has the quick-release properties of inorganic fertilizers and should not be considered an organic fertilizer.

Inorganic fertilizers are nutrient elements derived from sources which are not organic; that is, from sources which neither have a carbon structure nor have been derived from living matter. Examples of inorganic fertilizers are ammonium nitrate, ammonium phosphate, potassium nitrate and potassium chloride.

Fertilizers may contain both organic and inorganic components. Generally, organic compounds are insoluble in water while inorganic compounds are water soluble. Therefore organic compounds release elements more slowly. An exception, urea, is an organic material that releases nitrogen fairly rapidly.

A **complete** fertilizer contains sources of nitrogen, phosphorus and potassium. An **incomplete** fertilizer contains one or two of these elements in any combination, but never all three. Other fertilizer nutrients such as iron or magnesium may be present but are not considered in the definition of "complete" and "incomplete" fertilizers.

Analysis and ratio

Fertilizer analysis or grade is the minimum guaranteed **percentage by weight** of nitrogen (N), phosphorus (expressed as P_2O_5 equivalent), and potassium (expressed as K_2O equivalent), and is printed on the container in that order.

For example, a 100-pound bag of 20-10-5 fertilizer is formulated from nitrogen source(s) that supply 20 pounds of elemental nitrogen, phosphorus source(s) that supply the equivalent of 10 pounds of P_2O_5, and potassium source(s) that supply the equivalent of 5 pounds of K_2O.

Any of these elements missing from the formulation would be represented by a zero in the analysis. Ammonium nitrate, for example, which does not contain phosphorus or potassium, has an analysis of 33-0-0.

In addition to the total nitrogen, water insoluble nitrogen (WIN), if present, is also printed on the label as a percent of the total weight. For

Salt Indexes of Common Fertilizer Sources*

	Fertilizer	Formula	% N	% P_2O_5	% K_2O	Salt Index	Partial** Salt Index
Nitrogen	Ammonium nitrate	NH_4NO_3	35.0	—	—	104.7	2.99
	Ammonium sulfate	$(NH_4)_2SO_4$	21.2	—	—	69.0	3.25
	Sodium nitrate	$NaNO_3$	16.5	—	—	100.0	6.06
	Potassium nitrate	KNO_3	13.8	—	—	73.6	5.34
	Urea	H_2NCONH_2	46.6	—	—	75.4	1.62
	Natural organic		4.0	—	—	3.5	0.70
	Monoammonium phosphate	$NH_4H_2PO_4$	12.2	—	—	29.9	2.45
	Diammonium phosphate	$(NH_4)_2HPO_4$	21.2	—	—	34.2	1.61
Phosphorus	Superphosphate	$Ca(H_2PO)_2 + CaSO_4$	—	20.2	—	7.8	0.39
	Triple superphosphate	$Ca(H_2PO_4)_2$	—	48.0	—	10.0	0.21
	Monoammonium phosphate	$NH_4H_2PO_4$	—	61.7	—	29.9	0.49
	Diammonium phosphate	$(NH_4)_2HPO_4$	—	53.8	—	34.2	0.64
	Monopotassium phosphate	KH_2PO_4	—	52.2	—	8.4	0.16
Potassium	Potassium chloride	KC1	—	—	60.0	116.3	1.94
	Potassium nitrate	NO_3	—	—	46.6	73.6	1.58
	Potassium sulfate	K_2SO_4	—	—	54.0	46.1	0.85
	Monopotassium phosphate	KH_2PO_4	—	—	34.6	8.4	0.24

* Adapted from: Rader, Jr., L.F., L.M. White and C.W. Whittaker. 1943. The Salt Index—A Measure of the Effect of Fertilizers on the Concentration of the Soil Solution. Soil Science Volume 55, pp 201-218.

** Calculated per unit of N, P_2O_5, OF K_2O.

example, if half of the nitrogen of a 20-10-5 fertilizer is in a water-insoluble form, the WIN content is 10%.

Although WIN indicates the portion of nitrogen in a controlled-release fertilizer that is slowly soluble, it is not appropriate for coated fertilizers that encapsulate soluble nitrogen, such as sulfur coated urea. Instead, results of a coated slow release nitrogen (CSRN) test are listed on the bag. For a more detailed discussion, see Slow-Release Nitrogen.

Fertilizer ratio is the relative amounts of nitrogen, phosphorus and potassium. A fertilizer with an analysis of 20-10-5 would contain four times as much nitrogen as potassium and twice as much phosphorus as potassium. The ratio then would be 4:2:1.

Absorption

All fertilizer nutrients, regardless of the source, are absorbed by plant roots as charged atoms or groups of atoms called ions—the nutrient salts. These ions exhibit either a positive or a negative charge which is essential for root absorption by electrical attraction.

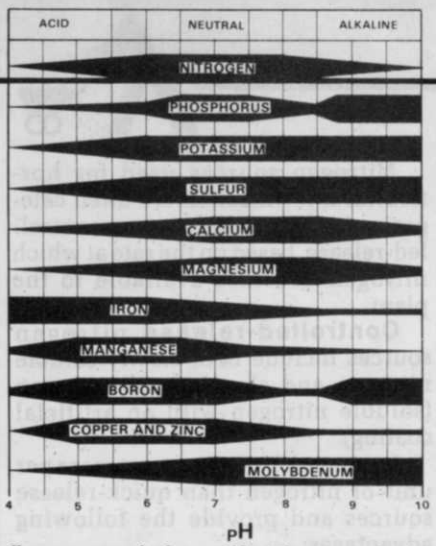
Inorganic fertilizers form ions readily when dissolved in water and therefore are quickly available for root absorption. Organic fertilizers—both natural and synthetic—must be hydrolyzed or decomposed by soil microorganisms from complex compounds to the same nutrient salts provided by inorganic fertilizers. The rate of decomposition is dependent upon many soil factors such as temperature, moisture and pH.

Burn

Fertilizer burn is the visible symptom of insufficient water in a plant associated with an overapplication of fertilizer salts.

The movement of water through the root cell membrane is regulated by the concentration of dissolved fertilizer salts in soil solution outside the cell relative to the concentration of dissolved salts within the cell. The cell membrane tries to control the concentration of salts on both side of it by allowing water (and dissolved salts) to flow from one side of the membrane to the other.

Normally, the plant cell takes in both water and salts. If too much fertilizer is applied to the soil and is dissolved by soil water, the high concentration of salts outside the plant cell will cause the membrane to stop the inflow of water or to let water



flow out of the cell. The result is known as fertilizer burn or physiological drought.

Salt index values are a measure of a fertilizer's relative tendency to increase the concentration of salts in the soil solution. Sodium nitrate has been given a salt index value of 100 and the value for all other fertilizers is relative to an equal weight of sodium nitrate. The higher the salt index, the greater the potential for a fertilizer to cause burn.

Because some nutrient sources are more concentrated than others (that is, have a higher percentage of N, P_2O_5 or K_2O) the actual increase in burn potential is affected by the application rate as well as the salt index. The partial salt index is calculated per unit of each nutrient and compares the relative burn potential of fertilizers based on equal amounts of nitrogen or P_2O_5 or K_2O equivalents.

Soil pH

The term pH expresses the relative concentration of hydrogen (H¢) and hydroxyl (0H-) ions in solution. A pH of 7.0 means the hydrogen and hydroxyl ions are equal and the solution is said to be **neutral**. A pH below 7.0 indicates the soil solution contains more hydrogen ions than hydroxyl ions and is said to be **acid**. Similarly, a pH above 7.0 means the solution is **alkaline**, containing more hydroxyl than hydrogen ions.

The soil pH may influence nutrient absorption and plant growth through the effect of hydrogen ions and their indirect influence on nutrient availability. In most soils the latter effect is the most significant.

The presence of an element in the soil is no guarantee that it is in a soluble form available for absorption. The concentration of hydrogen and associated ions affects soil reaction and the formation of soluble and insoluble compounds. All nutrients must be soluble to be available for root absorption. Each nutrient has a pH of maximum availability simply because within this range it forms a large proportion of soluble compounds. The relationship between soil reaction and nutrient availability for 12 of the essential elements is shown in a table in this article.

Plant species differ in their response to soil acidity because of differences in nutrient requirements. For most plants the conditions of nutrient availability, without toxic amounts, are **best near pH 6.5**. However, certain plants—such as rhododendrons, azaleas, pines and camellias—require comparatively large amounts of nutrients that are soluble in acid solution. They are "acid-loving" plants and grow best in soils of about pH 5.5.

Soil acidity, as such, is seldom toxic to plants but in soils with pH values below 5.5, certain elements such as aluminum or manganese may become soluble to levels toxic to plant growth.

In some cases, nutrient availability can be improved by correction of the soil pH as well as by supplemental fertilization. Sulfur and agricultural lime are the materials used most frequently to alter the soil reaction or pH. **Lime increases the pH** (decreases acidity); **sulfur lowers the pH** (increases acidity).

Ideally, the pH of soil within the root zone of a plant should be measured every three to five years and, if necessary, adjusted to the most favorable range for that particular species. Unfortunately, lowering the pH of an alkaline soil is not always successful, particularly if the soil is inherently calcareous with significant calcium reserves.

Leaching

Leaching is the removal of materials in solution from the root zone. Leaching is caused by percolation, the lateral and downward movement of water through soil.

Loss of nutrients due to leaching is proportional to the amounts of water percolated through the soil. Water dissolves minute quantities of mineral and organic matter which commonly move with the water. Since soil and weather conditions vary throughout the United States, leaching affects soils of humid regions more, on the whole, than it does most soils of dry regions.

All nutrients are subject to leaching, although not to the same degree. Calcium losses are the greatest of any nutrient known. Nitrate salts—the

form of nitrogen primarily absorbed by plant roots—moves with ground water and rapidly leaches from the root zone. Magnesium, sulfur and potassium are moderately leached, whereas only a trace of phosphorus is lost.

PRIMARY NUTRIENTS

Nitrogen, phosphorus and potassium are the three macronutrients required in the greatest quantity from the soil and are commonly applied for turfgrass and landscape plants. In addition to the primary fertilizer elements, the micronutrient iron is most likely to be found deficient in soils. Other elements which are sometimes deficient may be determined by soil and tissue analysis or by testing plant response.

Nitrogen

Nitrogen is required in larger amounts than other elements supplied by the soil and is formed into compounds that comprise up to 50% of the dry weight of plant cells. It is more often deficient in soils than any of the other essential nutrients.

Plants can absorb nitrogen as either the ammonium (NH_4+) or nitrate (NO_3-) ions. Urea or inorganic forms of nitrogen are converted to ammonium which is subject to volatilization when surface applied. Where conditions favor volatilization, 25% or more of the applied nitrogen may be lost in the atmosphere.

Because of the transitory nature of nitrogen in mineral soils, soil analysis is not as useful in determining deficiencies as an observation of symptoms. Nitrogen deficiencies are observed as uniformly yellowish-green leaves or needles which are more pronounced in older tissue. Leaves are small, thin and may start dying at the tips.

Nitrogen sources used for horticultural fertilization are often categorized as quick-release or controlled-release, based on the rate at which nitrogen becomes available to the plant.

Controlled-release nitrogen sources include both slowly soluble nitrogen and slow release nitrogen (soluble nitrogen with an artificial coating).

In general, both types cost more per unit of nitrogen than quick-release sources and provide the following advantages:

1 supply nitrogen gradually which reduces the number of applications necessary
2 reduce nitrogen leaching and volatilization which increases efficiency
3 reduce risk of burn which allows higher application rates.

Slowly soluble nitrogen includes natural and synthetic organic fertilizers which are slowly soluble (not urea) and are broken down by hydrolysis and/or microbial activity into soluble forms of nitrogen .

Natural organics include sewage sludge and plant and animal wastes, generally low in nutrient content. Milorganite (6% N) is a granular sewage sludge produced by the City of Milwaukee, WI, since 1926. Milorganite has been the most widely used natural organic for turfgrass fertilization.

Low analysis natural organic fertilizers are less prone to damage turf or plants through incorrect equipment calibration than other fertilizers.

The most common synthetic organic nitrogen sources are ureaformaldehyde (UF) and isobutylidene diurea (IBDU).

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Lawrence, PA 15055, 412/341-6447

EDM Distributors, Inc. (CT, VT & Western MA)
Agawam, MA 01001, 413/786-6977

Ross Lawn Equipment (Upstate NY)
Tonawanda, NY 14150, 716/691-7642

Steven Willand, Inc. (NJ, NY, LI & Eastern PA)
Fairfield, NJ 07006, 201/227-5656

SOUTH

Adrian Metal & Tractor, Inc. (Eastern NC & Eastern SC)
Conway, SC 29526, 803/365-5501

Chemical & Turf Specialty Co., Inc. (TX & OK)
Garland, TX 75041, 214/271-4549

Lawn Care Sales & Service (TN)
La Vergne, TN 37086, 615/793-6052

Ransomes Florida, Inc. (Southern FL)
West Palm Beach, FL 33406, 305/689-4788

South Central Turf Equipment (MS & LA)
Jackson, MS 39209, 601/922-7437

Spain Distributing Co. (Western NC & Western SC)
Charlotte, NC 28210, 704/552-9582

Stovall & Company, Inc. (GA & AL)
Atlanta, GA 30318, 404/352-1555

Turf & Industrial Eqt. Co. (Northern FL)
Winter Springs, FL 32708 305/327-2220

MIDWEST

Brentom Lawn & Turf Corp. (KY & Southern IN)
Louisville, KY 40207, 502/895-8687

Conniff's Power Equipment, Inc. (IN & Southern OH)
Richmond, IN 47347, 317/935-2344

General Turf & Grounds Equipment Co. (KS & MO)
Columbia, MO 65205, 314/445-6609

Grass Roots Turf Equipment Co. (IA & NE)
Des Moines, IA 50321, 515/223-5980

Hanley Equipment, Inc. (WI)
Sun Prairie, WI 53590 608/837-5111

Ideal Mower Sales (MI & Western OH) Ferndale, MI 48220, 313/541-4200

Kaye Corporation (MN, ND & SD)
Mankato, MN 56001, 507/345-5083

Olsen Distributing Company (IL)
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WEST

Colorado Outdoor Power Equip., Inc. (CO, WY & NM)
Denver, CO 80223, 303/733-4651

Highland Equipment Co. (UT)
Salt Lake City, UT 84103, 801/364-9445

Huber Incorporated (AZ)
Phoenix, AZ 85016, 602/955-1731

Jenkins Machinery Company (CA, NV & HI)
Concord, CA 94520, 415/685-6685

Turf-Go Northwest (WA, OR & AK)
Seattle, WA 98133, 206/771-4885

CANADA

Consolidated Western Ind. Co., Ltd. (Alta & Sask)
Edmonton, Alta T5S 1H4, 403/484-7181

G. C. Duke Equipment Ltd. (Ont, Que & Maritime Provinces)
Burlington, Ont L7S 1W6, 416/637-5216

Par Equipment Ltd. (Man)
Winnipeg, Man R3E 3J8, 204/775-8988

Rollins Machinery Ltd. (B.C.)
Vancouver, B.C. V5T 1H8, 604/874-6404

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RANSOMES

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The grass machine.

Circle No. 246 on Reader Inquiry Card

with aldehyde. Formaldehyde is the most common aldehyde used.

UF reaction products range from those which are predominantly soluble, short-chained methylol urea, to those which contain short- (soluble) and long- (insoluble) chained methylene ureas.

All longer-chained methylene ureas depend on **microbial decomposition** for release of nitrogen. Factors such as **soil temperature**, which affects microorganism activity, may then also affect the rate at which nitrogen is released from these products. UF reaction products which contain water insoluble nitrogen are particularly sensitive to changes in microorganism activity.

Since 1977, several liquid forms of UF reaction products have become available for liquid fertilization. Hawkeye's Formolene (30% N) and Georgia Pacific's 4341 (30% N) are two fertilizers which contain soluble methylol urea as the predominant UF compound. In addition, both products contain approximately 50% free urea.

C.P. Chemical's Nitro-26 (26% N) is a solution of methylene urea and approximately 15% urea. Cleary's Fluf (18% N) is a suspension liquid (a liquid containing microfine particles) which, like Nitro-26, contains methylene urea as its predominant UF compound and approximately 15% urea. In addition to soluble, short-chained methylene urea, Fluf contains 20% water insoluble, long-chained methylene urea.

With liquid UF reaction products, knowledge of the relative amounts of urea, methylol urea, methylene urea, and water insoluble nitrogen can be used as a guide in predicting their potential to cause fertilizer burn.

Products which contain water insoluble nitrogen and/or are predominantly methylene urea would have a lower potential to burn than those containing methylol urea. Liquids which have a lower urea content would also have a lower potential to burn.

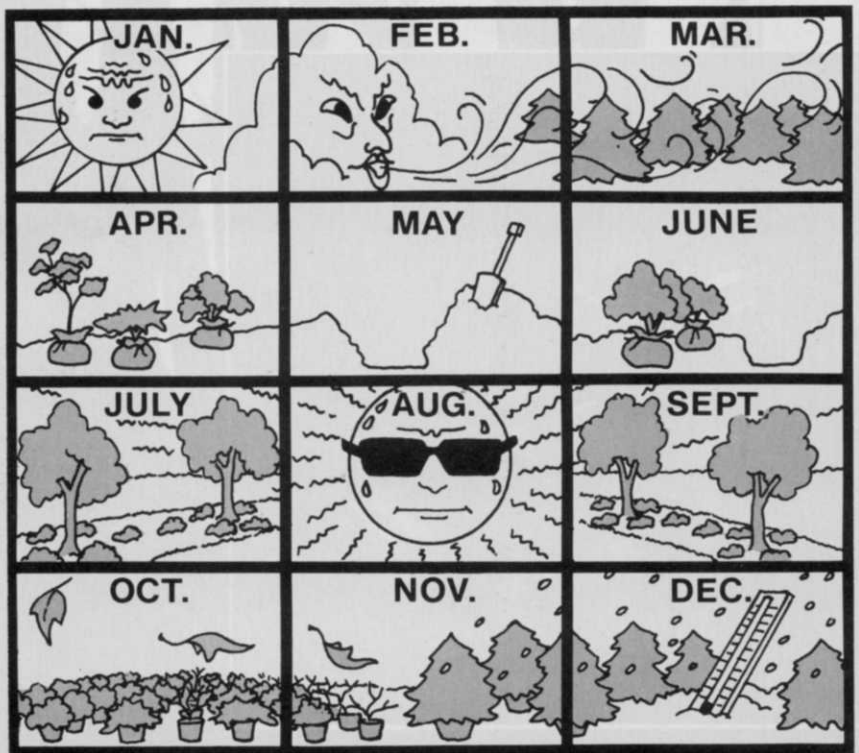
For these reasons, Fluf would have the least potential for burn, followed by Nitro-26 and then Formolene and GP4341. Although field tests have verified the burn potential of these products in the order given, the magnitude of the difference between the products is not great.

Tests have shown that all UF reaction products have a substantially lower potential to burn than urea. Research has also demonstrated little difference between these products and urea regarding the rate at which nitrogen releases.

Another UF reaction product which is available in both a powder and a granular form is O.M. Scott and Sons' methylene urea fertilizers. Scotts first introduced methylene ureas into their fertilizer products in 1958.

Scotts' fertilizers include both water soluble and water insoluble methylene ureas. The water soluble portion ranges from approximately 40% for nursery stock to 70% for turfgrass fertilization. Although Scotts produces both complete and incomplete fertilizers containing methylene ureas, the fertilizers containing nitrogen only range from 38% to 41% nitrogen. Length of nitrogen release is up to 2 months for turfgrasses and from 2-6 months for container grown nursery plants.

Nitroform marketed by Nor-Am



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All Year Long.

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- Protects against desiccation . . . winter and summer.
- Stays flexible, looks natural.

And FOLICOTE costs up to 50 percent less to apply than any other anti-desiccant or anti-transpirant on the market.

FOLICOTE is a wax emulsion that mixes easily with water and stays mixed. When used as directed, FOLICOTE has been proven in university trials to be effective and non-phytotoxic on a wide range of plants.

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AQUATROLS CORPORATION OF AMERICA, INC.
1432 UNION AVE., PENNSAUKEN, NJ 08110

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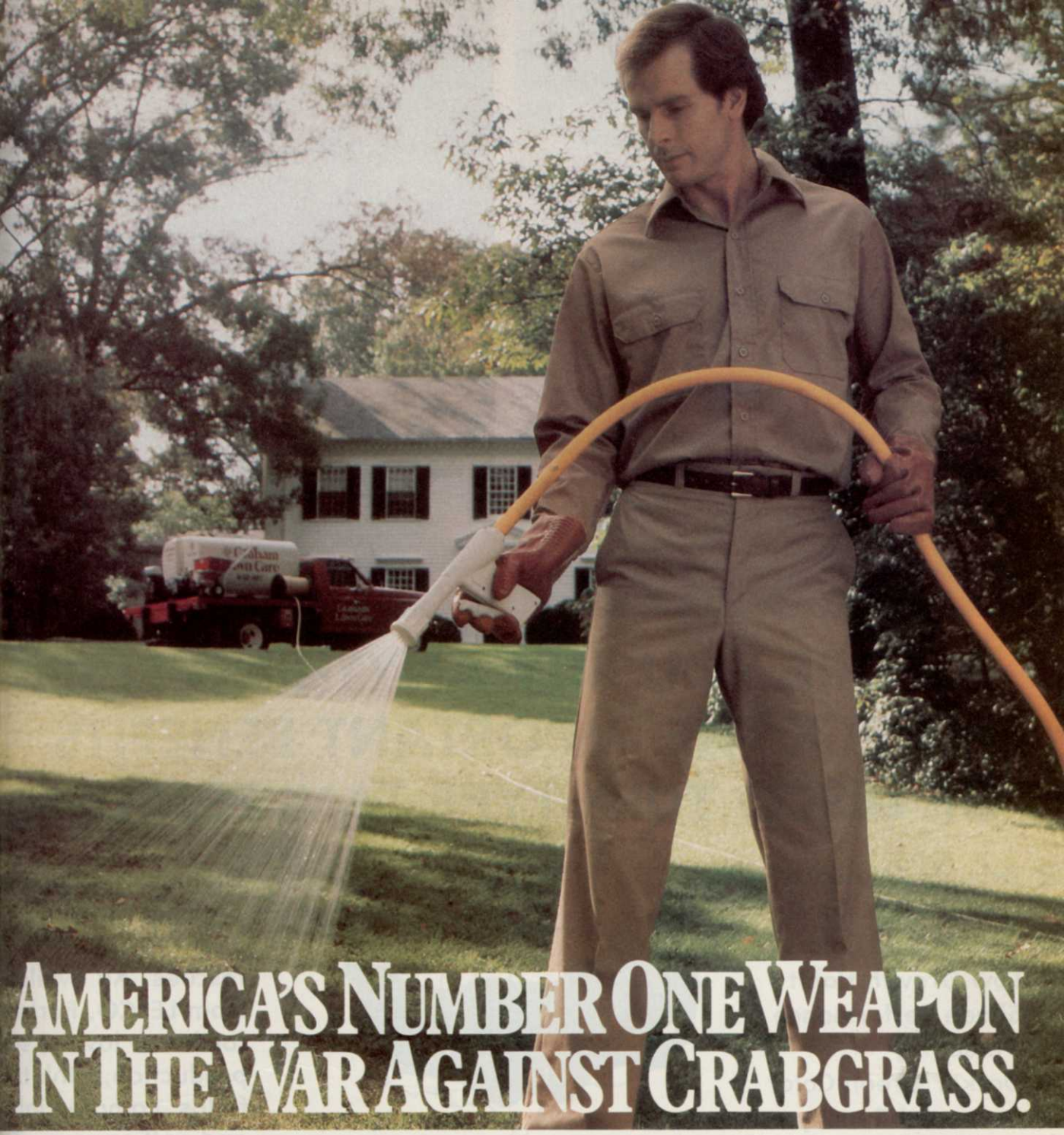

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The overwhelming choice among America's biggest lawn care companies is Betasan® for crabgrass control.

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It's not hard to see why. Because year after year, Betasan gives lawn care professionals better control of Smooth and Hairy Crabgrass, without a worry about damaging existing turf. One application usually stops crabgrass cold, all year long.

Betasan is easy to apply and available in liquid and granular formulations.

Betasan is safe and effective on established bluegrass, fescue, bentgrass, Bermuda grass, annual and perennial rye, Zoysia, bahia, centipede and St. Augustine.

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Shaded area indicates where Olympic, Falcon and Apache are adapted.

Olympic, Falcon and Apache. Three of the best turf-type tall fescues. All available from LESCO. Perfect for home lawns, sod production, athletic fields, commercial turf and golf courses. The benefits are tough to ignore.

Quantities of turf-type tall fescues may be limited. Call Barb today to place your fall order.

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Turf-Seed, Inc.

LESCO

Lesco, Inc., 20005 Lake Road, Rocky River, Ohio 44116, (216) 333-9250

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Chemical Company, qualifies as a ureaformaldehyde fertilizer and not just simply as a UF reaction product. This is because Nitroform has at least 60% water soluble nitrogen (actually 66%) and the water insoluble nitrogen does not test less than 40% active by the nitrogen activity index (actually 40%).

Activity index indicates the amount of water insoluble nitrogen which is soluble in boiling water. An activity index of 40 means that 40% of the methylene ureas are soluble in hot water, while the remaining 60% are insoluble in hot water. Length of nitrogen release is 2 years. Lebanon Chemical also manufactures a ureaformaldehyde.

Isobutylidene Diurea(IBDU) was first marketed by Estech, Inc. in the late 1960's. IBDU is produced by reacting urea with isobutyraldehyde. For turfgrass fertilization, IBDU is sold as a granule in 2 sizes, fine (0.5-1.00 mm diameter) and coarse (0.7-2.5 mm). For container-grown and landscape plants, "briquettes" of IBDU are also available, called Woodace. They last in the soil from one to three years depending upon size, and are complete fertilizers.

Urea is released from IBDU through the hydrolytic action of water. The primary factors which influence the rate at which nitrogen is released from IBDU are **soil moisture and particle size**. Increasing soil moisture and decreasing particle size will increase the rate at which nitrogen is released.

IBDU in granular form contains 31% nitrogen of which 85-90% is insoluble.

Slow-release nitrogen is produced by encapsulating quick-release nitrogen with an insoluble coating. The soluble nitrogen is released through tiny pores as the coating is broken down in the soil. A mixture of variable coating thicknesses provides continuous release of soluble nitrogen for a controlled period of time. Only two slow-release nitrogen sources are commercially available —sulfur-coated urea and Osmocote®.

Sulfur-Coated Urea(SCU) is produced by coating granular or prilled urea with molten sulfur. The manufacturing process may also include the application of a sealant (microcristalline wax) and a conditioner (diatomaceous earth).

Degradation of the coating and diffusion of nitrogen through pores or imperfections in the coating are responsible for release of nitrogen. Because of varying coating thicknesses and imperfections, the rate at which nitrogen releases also varies. **Soil moisture** is the major factor which influences release of nitrogen. Increasing soil moisture will speed nitrogen release.

A prediction of the rate at which nitrogen is released from SCU is known as dissolution rate. Dissolution rates range from 20% to more than 80%. Nursery grade SCU has a lower dissolution rate than turf grade. For SCU coated with microcrystalline wax a dissolution rate of 25-40% has given good initial turfgrass response. Ask the manufacturer for the dissolution rate of SCU to determine an accurate N release rate.

Although a 2-4 month residual is claimed for surface applications to turfgrass, the nitrogen release rate may be as great as one year, depending on placement and product used. Commercial products range from 32% to 38% nitrogen. SCU is available from Canadian Industries Ltd., Ag Industries Manufacturing Corporation (a division of Lesco Inc.), and O.M. Scott and Sons.

Osmocote® has been available to the horticultural and landscape industry since 1967. Osmocote is manufactured by the application of a plastic, semiporous coating to prilled soluble fertilizer sources such as ammonium nitrate, ammonium phosphate, urea and calcium phosphate.

Nutrients are released from Osmocote by diffusion. Water enters the plastic shell, dissolves the soluble nutrients which then diffuse into the soil for plant uptake. **Soil temperature** will significantly influence the rate at which nutrients are released. Warmer soil temperature increases the release rate, while cooler soil temperatures decrease the release rate.

Nitrogen release rate varies from three months to one year plus, depending on the nitrogen source(s) used and placement of the fertilizer. Osmocote is available through Sierra Chemical Company.

Quick-release nitrogen sources are all soluble in water and are either available for root uptake in their present form or are readily converted to available forms in the soil. Inorganic nitrogen fertilizers (sources which do not contain carbon) such as ammonium nitrate and ammonium sulfate are quick-release. Urea, although technically organic, is soluble and possesses many of the same characteristics as inorganics.

In general, the quickly available nitrogen sources are less expensive than controlled-release sources and have the following characteristics:

1 Readily soluble in water
2 Immediately available for absorption
3 Can cause growth flushes
4 Short soil residual
5 Leach and/or volatilize
6 High burn potential.

Recent developments in ureaformaldehyde reaction products have provided quick-release nitrogen with a burn potential much lower than for other soluble nitrogen sources. A discussion of these products is included in the section on Ureaformaldehyde Reaction Products.

New products

Oxamide—Current projections by Estech, Inc. are that Oxamide will be marketed in 1985. Oxamide, which is a diamide of oxalic acid, is made from hydrogen cyanide. Tests have been conducted with both powder and granular forms.

The method by which nitrogen is released from Oxamide is chemical hydrolysis by water. **Particle size** influences the rate at which nitrogen is released from Oxamide—the larger particle releases more slowly.

Research has shown that Oxamide has a residual of from 60 to 100 days although the larger particle has shown nitrogen release up to six months. Oxamide contains 31% nitrogen.

Triamino-triazine/urea under development by Melamine Chemicals, Inc. is a homogeneous granule of triamino-triazine (66% nitrogen) and urea (46% nitrogen). Triamino-triazine is a crystalline powder produced by heating urea under pressure in the presence of a catalyst.

Both microbial decomposition and chemical hydrolysis are responsible for the release of nitrogen. **Soil temperature, moisture and pH** all influence the rate at which nitrogen becomes available from this product. The triamino-triazine portion of the fertilizer is slowly broken down in the soil. There is an initial lag of over 60 days before nitrification followed by a controlled release for a period of one to two days.

A triamino-triazine/urea product with an analysis of 60-0-0, containing $1/3$ urea, $2/3$ triamino-triazine by weight, is currently available for forest and rice fertilization. Although still being tested, this new source of

nitrogen may prove to be a valuable alternative to conventional nitrogen sources used in fertilizing turfgrasses and landscape plants.

Nitrification Inhibitors—As mentioned previously, substantial losses of nitrogen can result from volatilization and leaching. A concept that has been practiced with fertilization of field crops is the use of a nitrification inhibitor.

The objective is to slow the nitrification process for sources of quick-release nitrogen which are ammonium-based or ammonium-forming such as ammonium nitrate, ammonium sulfate and urea.

Nitrification is a two-step process where ammonium is converted to nitrite then nitrate by soil bacteria. The nitrification inhibitor reduces the bacteria responsible for the conversion process which keeps the nitrogen in the ammonium form. In the ammonium form, the nitrogen is less subject to losses by leaching. Likewise, maintenance of nitrogen in the ammonium form reduces the potential for denitrification (which is loss of nitrate as a gas) which improves the overall efficiency of the nitrogen source.

Nitrapyrin, marketed as N Serve by Dow, is a nitrification inhibitor which is currently registered for use in corn, wheat, sorghum, cotton and rice. Because nitrapyrin is volatile, it must be incorporated into soil during or following application. Dow is currently testing nitrapyrin as a nitrification inhibitor for turfgrass. Lebanon also has an inhibitor for turf.

Another interesting concept developed to reduce the loss of nitrogen from volatilization is the addition of soluble magnesium or calcium to urea.

When applied to soil, urea is converted into ammonium carbonate. In this form, the ammonium ion can be changed to ammonia and lost as a gas. When magnesium chloride is included with urea, ammonium chloride—instead of ammonium carbonate—is formed and is less susceptible to ammonia loss.

Although still being evaluated, NVN is a urea-magnesium solution marketed for turfgrass fertilization in 1984 by Great Salt Lake Minerals and Chemicals Corporation. Further testing and experience with this product should help to document the practical application of this product.

Phosphorus

Phosphorus is especially important in seedling growth and is utilized in carbohydrate conversions, energy transfer and is a constituent of nucleoproteins and phospholipids. Phosphorus helps maintain a desirable pH in cells and contributes to root development.

Phosphorus deficiencies are most often encountered in seedlings. Leaves or needles turn a dull green becoming reddish-bronze to purple, especially along margins in cold weather. Some phosphorus is provided by soil minerals and soil organic matter but it is very slowly available from these sources.

Since phosphorus moves very little through soil, supplemental phosphorus tends to accumulate near the application site, moving no more than a few inches in 50 years. Plants take up phosphorus primarily in the

continued on page 46

Sentinel Swans — The System that Keeps the Geese Away!

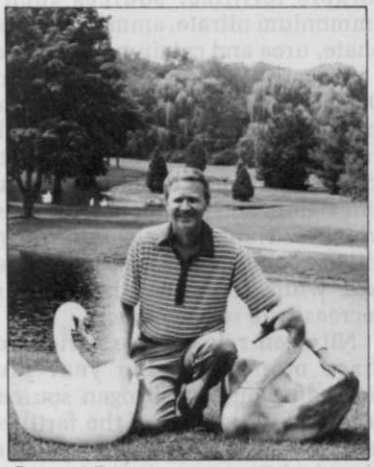
- ☐ Proven method for control of Canada Geese
- ☐ Perfected after years of field testing
- ☐ Uses life-size, life-like swan replicas
- ☐ Ready to float, no mountings needed

After five years of field testing at the Innis Arden Golf Club in Old Greenwich, Connecticut, Superintendent Pat Lucas introduces the *Sentinel Swan Family System* . . . . antidote to Canada Geese "Fowl Play".

The *Sentinel Swan Family System* works effectively for two reasons; the *System* devised by Pat Lucas and the utilization of swan replicas that are life-like, life-size, and *Natural* in appearance. Research bears out that Canada Geese are not easily fooled.

You've read about this new system in "Golf Course Management" and "Golf" magazines. The *Sentinel Swan Family System* makes the geese fly over, not fly down. Eliminates nasty geese problems — unhealthy droppings, packed mower rollers, feather-clogged irrigation suction strainers, dead turf, time-consuming cleanup, and golfer complaints.

Buy from the man who originated *The System That Keeps The Geese Away*. Call Pat if you have questions regarding your specific needs.



Pat and Friends

Sentinel Swans
Old Greenwich
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(203) 637-3939.

To Order:	One Family System (box of 5 swans)	$130.
	Two to Four Family Systems	125. each box
	Five or more Family Systems	120. each box

Connecticut residents add 7½% sales tax. Orders shipped freight collect.
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NEW ... HARLEY
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PULVERIZES, LEVELS & RAKES ROCK, roots and other trash. Double Roller gives deeper penetration and allows moving of several windrows into one for faster pickup. **New scarifier.** Also ask us about Harley Rock Pickers.

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DENSE MAKES SENSE!

Manhattan II guarantees greener turf or greenbacks.

Breakthrough.

Manhattan II's astonishing density surpasses any other ryegrass you can buy.

Ten years of careful research and testing has resulted in a ryegrass that's so dense, it gives you up to 40% more green grass, seed for seed, compared to other turf-type ryegrasses. What does it mean for you? Read on!

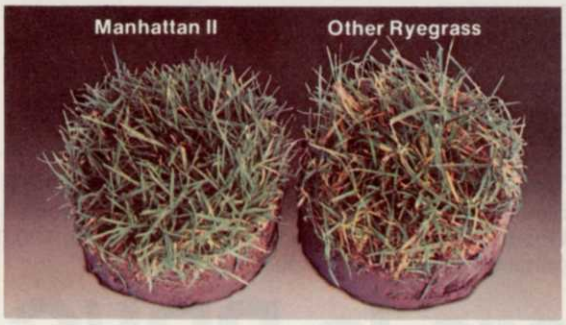
Economical.

Manhattan II is not only beautiful, it's beautifully practical. Because of its unusual density, it actually crowds out weeds. So it needs less herbicides. And it cuts clean and sharp, with no frayed leaf tips.

Ball sits up so pretty, it's almost like teeing up on the fairway.

Tough.

Manhattan II has very good resistance to Rhizoctonia brown patch, leaf spot, crown rust and stem rust. Add drought and heat tolerance and you've got a turfgrass that's tough and persistent.



Wears better, looks better, lasts longer! Super density does it!

This was the best you could get – until Manhattan II.

Greener turf or greenbacks.

If you don't agree that Manhattan II is everything we say it is: denser, greener and tougher than the ryegrass you're using now, we'll send you a check for $50.00. Ask for complete details.

Manhattan II

There's more to it.

Manhattan II sounds terrific:
- ☐ Have someone contact me.
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Turf Merchants, Inc., Albany, OR/Turf Seed Inc., Hubbard, OR
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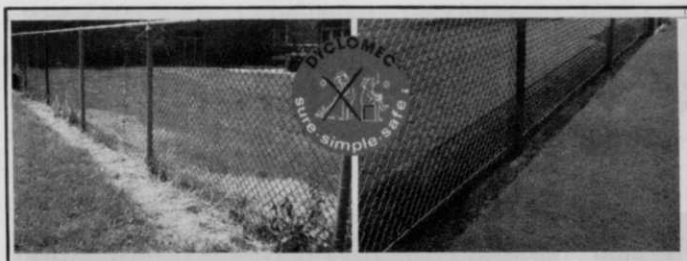


The grass along the fence in the photo at left was killed with a fast-acting systemic post-emergent herbicide. Obviously, no professional groundskeeper could abide this ugly mess, so the dead vegetation has to be removed with expensive hand labor. The systemic product is recommended for lawn renovation so, naturally, vegetation will grow back as new seeds germinate, resulting in an endless cycle of retreatment, ugly dead vegetation and more hand labor. Clean up a fence line with Dyclomec and vegetation will never again be a problem, because an annual pre-emergent application of Dyclomec will form a vapor barrier and keep the area absolutely clean.

Dyclomec with its pre-emergent and post-emergent action is ideal for vegetation control in mulch, or bark around roses and ornamentals, or in flagstone and gravel walkways. It works its way down to the ground and forms a vapor barrier which provides season-long weed control and maximum safety to desirable plants.

Dyclomec turns Problem Areas into Beauty Spots

... and the vapor barrier eliminates repeated investment of hand labor to clean out dead vegetation.

Dyclomec is surely the most efficient herbicide that has ever been offered to professional landscapers. In fact, it is called the *landscaping herbicide*.

Now, at last, the groundskeeper can easily and economically achieve that manicured look, which consists of contrast. Of sharply defined areas where immaculate turf is contrasted with areas of beautiful, naked earth. Where ornamentals grow in an area of beds that are free of any distracting growth.

Until the advent of Dyclomec, such pristine landscaping could only be achieved with repeated investments of hand labor to clean out dead vegetation resulting from an endless cycle of regrowth and retreatment with a systemic herbicide.

But once an area has been cleaned up with Dyclomec, hand labor to remove dead vegetation will never again be necessary because an annual application of Dyclomec will keep the area absolutely clean. How is this possible?

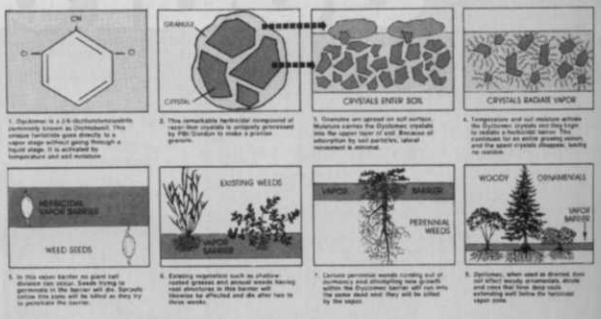
On the page at the right are step-by-step illustrations of how Dyclomec works. Understanding its principle will help you discover the many labor-saving, money-saving ways it can help you in landscape maintenance.

We urge you to read it carefully and call us toll free if you have any questions.

Dyclomec Applicator for Uniform Distribution

Because proper distribution of Dyclomec is important, this patented Acme Spred-Rite® G Spreader is the ideal tool. Granules are gravity-fed through deflector spikes that give a uniform pattern. Hold the head high for a wide swath; lower for a narrow swath; remove it for the finest line of control. Regulate flow with interchangeable orifice disks. Spreads any granular material. Lightweight. No moving parts.

How Dyclomec controls weeds without harming ornamentals:



1. Dyclomec is a 2,6-dichlorobenzonitrile commonly known as Dichlobenil. This unique herbicide goes directly to a vapor stage without going through a liquid stage. It is activated by temperature and soil moisture.
2. This remarkable herbicide compound of vapor-blue crystals is uniquely processed by PBI/Gordon to make a granular granule.
3. Granules are spread on soil surface. Moisture carries the Dyclomec crystals into the upper layer of soil. Because of adsorption by soil particles, lateral movement is minimal.
4. Temperature and soil moisture activate the Dyclomec crystals and they begin to radiate a fumigant vapor. This continues for an entire growing season, and the spent crystals dissipate, leaving no residue.
5. In this vapor barrier no plant cell division can occur. Seeds trying to germinate in the barrier will die. Sprouts below this zone will be killed as they try to penetrate the barrier.
6. Existing vegetation such as shallow rooted grasses and annual weeds having root structures in this barrier will likewise be affected and die after has to move weeds.
7. Certain perennial weeds rooting out of surrounding and disrupting new growth within the Dyclomec barrier will run into the same dead end: they will be killed by the vapor.
8. Dyclomec, when used as directed, does not affect woody ornamentals, shrubs and vines that have deep roots extending well below the horizontal vapor zone.

Now available in both 50 and 25 lb. bags.

GORDON'S
PROFESSIONAL TURF PRODUCTS

pbi/gordon corporation

Call Gordon's Technical Service Department

If you have any questions about where and how to use Dyclomec, we invite you to call us. Our technical people have a combined experience of 85 years in working with the Dyclomec chemical.

TOLL FREE 1-800-821-7925
In Missouri 1-800-892-7281

DYCLOMEC™

BARRIER™ LANDSCAPING HERBICIDE

Circle No. 141 on Reader Inquiry Card

This 4-color, 2-page ad for Dyclomec® Landscaping Herbicide in *Weeds Trees & Turf* produced 1,757 inquiries. Even more impressive: Readex reader interest score for the ad was 68%...the highest score ever measured in *Weeds Trees & Turf*. And in the upper 3% of over 400,000 ads that have been measured by Readex. The ad was prepared by Eatough Associates.

Here is PBI/Gordon's recipe for advertising that sells:

PBI/Gordon's advertising successes over the last 10 years are legendary.

...Trimec® Turf Herbicide advertising has won numerous readership awards, and it has become the number one broadleaf herbicide in the professional turf market.

...Exhalt® 800 advertising has helped Gordon dominate the sticker-extender market among golf courses.

...and now comes Dyclomec Landscaping Herbicide, breaking all sales records for a new product.

What is Gordon's secret?

"It's as simple as one, two, three," grins George Walter, PBI/Gordon's ebullient Vice President of Marketing.

"First, develop a useful product with demonstrable points of superiority.

"Second, create an advertising theme that optimizes what can be said for the product.

"And, third, give the advertising dominant exposure in the dominant medium."

Indeed, Dyclomec is a unique, useful product: precise; economical; growing-season-long control of vegetation for landscaping and nurseries; can be applied anytime except when the ground is frozen.

The advertising theme, *Dyclomec turns problem areas into beauty spots*, certainly optimizes the story.

And *Weeds Trees & Turf* is the dominant medium in the turf market.

"*Weeds Trees & Turf* is our number one medium," continues George Walter. "It has outstanding reach and readership, and it sure does bring in the sales."

A GREAT MEDIUM TO GROW PROFITS IN

WEEDS TREES & TURF

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ENTER WEEDS TREES & TURF'S "FOLDING GREEN" SWEEPSTAKES

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3 Go to any listed booth, get an entry blank with complete rules/details, fill it out, and drop it in the ballot box.

4 Enter as often as you like, but only once at each booth.

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orthophosphate (H_2PO_4-) form. Although soils normally contain relatively large amounts of phosphorus, much of it is in forms not available to plants

Phosphorus availability is influenced by **soil pH**. At a pH below 5.5, iron and aluminum form an insoluble complex with phosphorus that is not available to plants. At a pH above 7.5, calcium combines with phosphorus to form insoluble compounds such as calcium phosphate, $CA_3(PO_4)_2$. Phosphorus is most available between pH 6.0 and 7.0.

The most common phosphorus sources for granular application are the superphosphates with a P_2O_5 equivalent of 20% to 48%. Soluble phosphorus sources include monoammonium phosphate (11-48-0) which is recommended for alkaline soils, and diammonium phosphate (18-46-0). Liquid ammonium phosphate (10-34-0) is often used where bulk tank storage is feasible. Monopotassium phosphate (0-52-34), a soluble, granular product, has an excellent potential as fertilizer because of its high analysis and low salt index, but high cost of production has limited its use.

Potassium

Potassium is found in all plant parts in relatively large quantities and functions in catalyzing reactions, regulating transpiration, and aiding in the translocation of materials between cells. Although more research needs to be done with turfgrasses and woody plants, potassium is thought to influence rooting and increase resistance to heat, cold, drought, and disease.

The effects of potassium on plants are more subtle than the effects of nitrogen because they are not normally expressed visually in terms of growth rate or leaf color. Potassium deficiencies may restrict the translocation of carbohydrates and nitrogen metabolism and are evidenced first as marginal and interveinal yellowing of older leaves. Leaf tips may roll, turn brown and wither; growth is often stunted.

Potassium mobility in soils is less than that of nitrate but greater than that of phosphates. The available form of potassium (K+) is strongly absorbed by clay particles which prevents excessive leaching except on sandy soils.

The most common potassium fertilizer is potassium chloride (0-0-62), although potassium sulfate (0-0-54) is often used in arid regions where chloride is a problem or in liquid fertilization programs because of its lower burn potential. Potassium sulfate has a lower solubility and may contain insoluble silica fractions. Potassium nitrate (13-0-44) is an excellent fertilizer but generally is not priced competitively with the chloride or sulfate forms. Monopotassium phosphate (0-52-34), as mentioned earlier, has excellent potential as a fertilizer but its use is limited because of its high cost.

MICRONUTRIENTS

With the exception of sandy soils, micronutrients are more likely to be unavailable in the soil than low in total amount.

Deficiencies of iron, manganese, zinc, copper and boron are sometimes found in certain plant species, especially in sandy or alkaline soils.

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Micronutrients commonly deficient in sensitive species should be included in the regular fertilization program. Once deficiency symptoms have developed, however, foliar sprays or trunk injections and implants may be necessary to correct the deficiency.

Iron is the micronutrient most likely to be deficient throughout much of the United States and Canada. Iron is most commonly deficient in alkaline soils, although excessive levels of phosphate, manganese, zinc, and copper can produce iron deficiency. Waterlogged soils also reduce the availability of iron.

Soil applications to prevent or correct micronutrient deficiencies include inorganic salts, chelates and sulfur. Results have not always been satisfactory due, in part, to insufficient applications of the amending agent, severity of the deficiency symptoms, and soil problems such as excess alkalinity or poor drainage.

Micronutrients in the form of nitrate or sulfate salts are often included in fertilizer formulations but not in sufficient amounts to correct a deficiency. In addition, micronutrient salts may become insoluble quickly in alkaline soils and, therefore, unavailable for absorption by plants.

Inorganic salts of micronutrients may injure turfgrasses at the rate recommended for woody plants and should be applied during the dormant period, preferably by subsurface application. Ferrous sulphate and ferric nitrate are available from agricultural and horticultural distributors.

Chelates remain more soluble in alkaline soils than inorganic salts and can be applied to the soil surface or injected into the soil. Chelates also are less likely to cause injury to plants than inorganic salts and last longer in the soil. However, the cost for chelated micronutrients is considerably higher than for inorganic sources.

Chelates are marketed under various trade names with formulations for different conditions and purposes. Sequestrene® from Ciba Geigy, Ferriplex® from Miller Chemical & Fertilizer Corporation, and XL Iron Chelate from Doggett Corp. are three chelated iron products. Recommended rates usually vary from 2 to 6 pounds per 1,000 square feet. Eagle-Iron®, produced by Eagle-Picher Industries, is effective for iron deficiencies in crops and is being tested for turf and woody plants. Select the proper product for a particular situation and follow directions on the label.

Acidifying agents, such as sulfur and sulfuric acid, are normally injected into the soil or placed in vertical holes. Depending upon the soil texture and pH, large amounts of sulfur may be required over a number of years to correct the pH of calcareous soils. To minimize the potential for injury to woody plants, 20 pounds per 1,000 square feet should be the maximum amount of sulfur applied at one time.

Turfgrass injury has been reported at rates above 5 pounds per 1,000 square feet. Attempts to acidify large areas of soil with existing landscape plants have generally been unsuccessful. Foliar sprays are especially effective on ericaceous plants, such as rhododendrons, to correct iron defi-

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ciencies. Not all plant species, however, respond to foliar-applied micronutrients.

Applications are recommended just prior to or during active shoot growth in the spring, although applications later in the season may also be effective. Response to foliar treatments will vary depending upon the species, age and condition of the plant; time of year; micronutrient applied; and severity of the deficiency.

For best results, the plant should not be suffering from moisture stress, the leaf surfaces should be thoroughly covered and the humidity should be high enough to allow the spray to remain on the leaf in soluble form long enough to be absorbed. Both chelated and inorganic micronutrients are recommended.

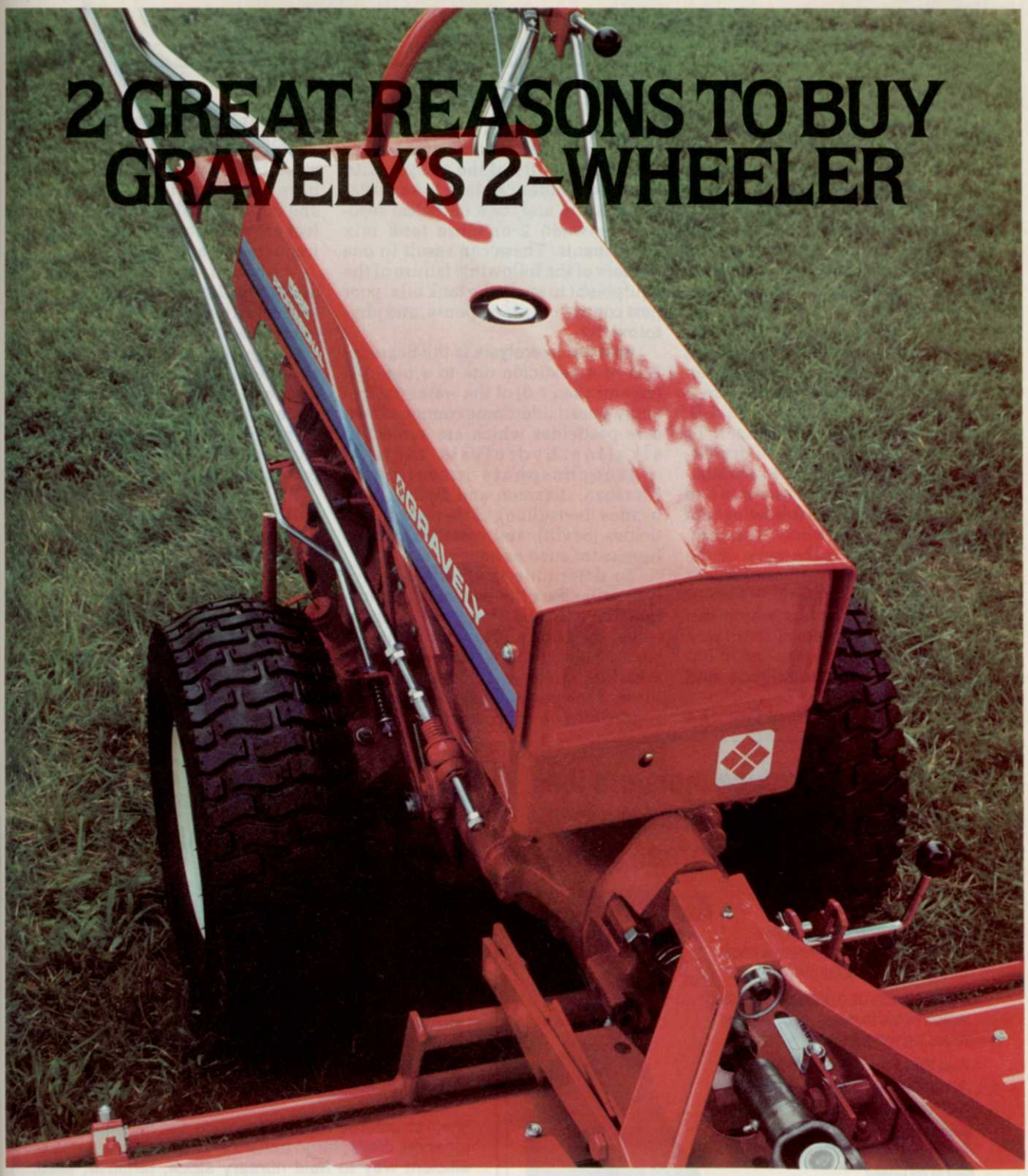
Trunk injections and implants are recommended to correct micronutrient deficiencies in trees over 4 inches in diameter which do not respond satisfactorily to soil treatments. For trees which have begun to decline, the best results are usually obtained from trunk treatments in conjunction with soil applications of fertilizer. Once the deficiency has been corrected in the trees, attempts should be made to maintain adequate micronutrient levels in the soil to avoid repeated wounding of the trunks.

Injections or implants should be spaced 4 to 5 inches apart and as low as possible on the trunk. Since the outermost xylem (wood) rings are actively transporting water and dissolved minerals, capsules should be placed or injections made in this area. Capsules or materials which seal the injection hole should be inserted just below the bark tissue to facilitate proper wound closure.

The best results and the most rapid callusing occur when the treatments are made before growth starts in the spring.

In addition to commercially available injection and implant products, micro-nutrients can be injected with the same equipment recommended for Dutch Elm Disease, which is inexpensive and simple to use. For iron-deficient pin oaks, dissolve 1.5 to 2 grams of ferric ammonium citrate in one to two cups of water for each injection. Trees under moisture stress should not be treated with trunk injections or implants.

Companies making tree injection and implant products include Creative Sales Inc. and J.J. Mauget Co.



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FERTILIZER/PESTICIDE COMBINATIONS

The use of fertilizer/pesticide combinations has become an accepted practice among most turfgrass managers whether applying fertilizers in a dry or liquid form. In combining both fertilization and pest control in one application, both time and labor savings can be realized.

Fertilizer/pesticide combinations can include herbicides, insecticides and fungicides along with fertilizer. In dry form, a popular combination is a broadleaf herbicide(s) (ie 2,4-D, MCPP) impregnated on fertilizer. To optimize results, the label of dry fertilizer/broadleaf herbicide combinations will frequently recommend making the application following rain or irrigation or when a dew is present. This improves the adherence of the herbicide to the leaf surface of weeds and maximizes absorption.

Two important factors which can reduce the effectiveness of fertilizer/pesticide combinations applied in liquid form are **incompatibilities and alkaline hydrolysis**.

In addition to checking the pesticide(s) label, a wise precaution to tank mixing is to conduct a jar test for the compatibility of the components. **Incompatibilities** can lead to an unstable mixture and/or a chemical reaction between 2 or more tank mix components. These can result in one or more of the following: failure of the equipment to apply the tank mix, poor pest control or turf response, and phytotoxicity.

Alkaline hydrolysis is the degradation of a pesticide due to a high pH (greater than 7.0) of the water used to apply a pesticide. Some common lawn care pesticides which are subject to alkaline hydrolysis include organophosphate insecticides (Dursban, diazinon and Dylox), herbicides (bensulide), carbamate insecticides (Sevin), and certain systemic fungicides such as benomyl.

To determine if alkaline hydrolysis will effect the pesticide application, have the pH of the water source tested by using a pH meter or litmus paper. Should the water prove to be alkaline, check with the manufacturer of the pesticide(s) used for their suggestions on pH correction.

FERTILIZATION OF TURFGRASS

Traditionally, turfgrass managers have applied fertilizer during spring and fall using color and the amount of leaf growth as a guide to the rate and frequency of application.

Although promoting good color and stimulating shoot growth are important objectives, frequently overlooked are nutrient influences on carbohydrate reserves, root growth, and the plant's ability to tolerate disease and environmental stress. An understanding of the impact of fertilizer applications on these factors can give refinement to a fertilization program.

Timing applications

An important objective in timing fertilizer applications should be to build carbohydrate reserves and promote root development. The response of warm-season and cool-season turfgrasses differ in this respect.

The predominant **cool-season** turfgrasses (bluegrass, perennial ryegrass, fescue and bentgrass) initi-

continued on page 54

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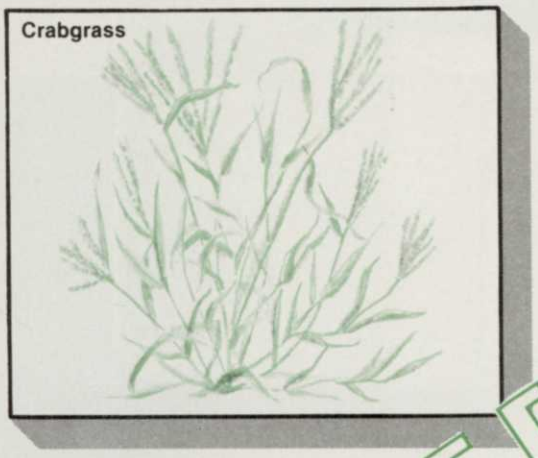

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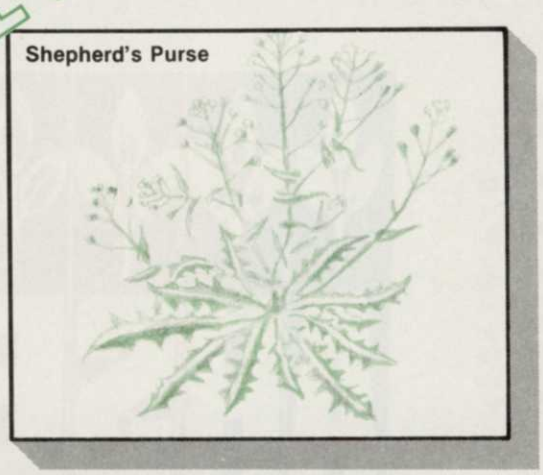

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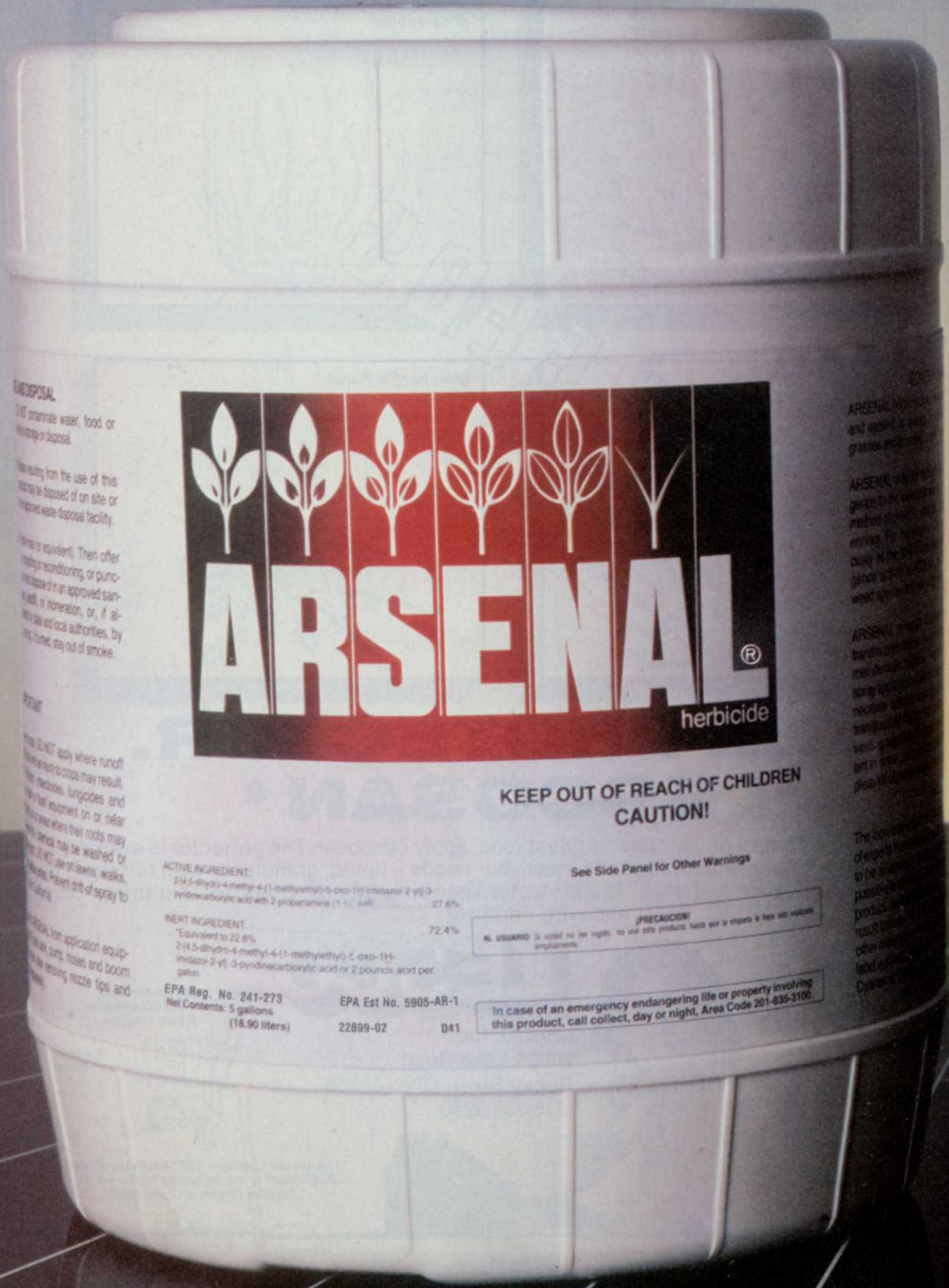

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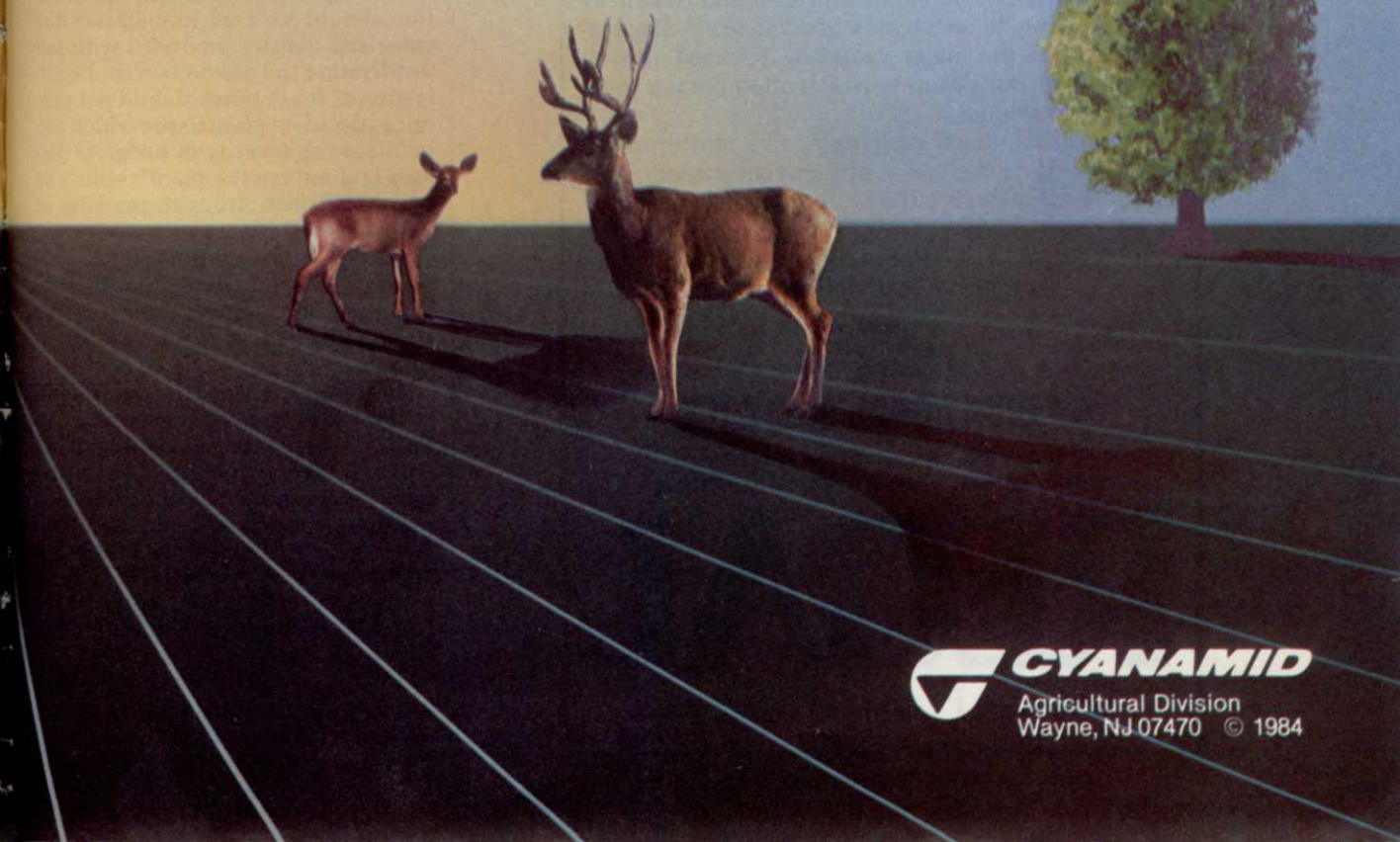

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continued on page 50

ate and develop their root system in the early spring and fall. For this reason, **fall** application of nitrogen is paramount to a fertilization program because it will increase carbohydrate reserves and root growth. Fall fertilization will also improve turf density by promoting greater rhizome and tiller growth.

In addition to regular fall fertilization (September-early October) a relatively new concept known as **late fall** or late season fertilization is being included in many maintenance programs. Late fall fertilization is applied when shoot growth slows or approximately at the time of the last regular mowing of the season.

Nitrogen applied at this time greatly enhances the photosynthetic production of carbohydrates. These carbohydrates are stored for use the following growing season, providing earlier spring greenup and an energy source for turfgrasses to recuperate from environmental and mechanical stress.

Another advantage of late fall fertilization is that it reduces the need for high amounts of spring-applied nitrogen. Excessive **spring** fertilization can actually reduce carbohydrate reserves and root development by stimulating rapid shoot growth. This is because growing shoots take priority over roots for carbohydrate utilization.

Both spring and summer fertilization should be used to maintain the color and density produced with fall fertilization the previous year. Fertilization at these times should not produce succulent plant tissue which can increase the severity of turfgrass disease and reduce the plant's ability to withstand heat, drought, mowing or wear stresses.

Applications of **potassium** will greatly contribute to the hardiness of the plant and help to "temper" the stimulating effects of nitrogen applications.

In contrast, most of the root growth in the **warm season** grasses, such as Bermudagrass, zoysiagrass and St. Augustinegrass, occurs during the spring and summer. Fertilization during these periods will stimulate root growth. However, only moderate applications of fertilizer should be made in early spring in areas where warm-season grasses experience winter dormancy.

Bermudagrass and St. Augustinegrass are subject to **spring root dieback** following spring greenup. Heavy fertilization during

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early spring may result in an additional stress during this critical survival period.

Like cool-season turfgrasses, warm-season turfgrasses accumulate carbohydrate reserves in the fall when shoot growth activity slows. Care must be taken with the timing of fall fertilization since it may decrease low temperature hardiness if applied late. Maintaining adequate potassium levels in fall will increase the tolerance to low temperatures.

As with cool-season turfgrasses, indiscriminate use of nitrogen fertilization in the summer can increase injury of warm-season grass subjected to disease or environmental stress. As mentioned previously, maintaining adequate soil potassium levels will aid warm-season turfgrass in their tolerance of heat, cold, mowing and wear stresses, and reduce their susceptibility to turfgrass diseases.

Rate of fertilization

The annual nitrogen requirement (pounds per 1,000 square feet) for turfgrass should be determined by considering several factors including the length of growing season, level of quality desired, purpose for which the turf is used, and the species and cultivars present.

The **length of growing season** or number of days (months) between the last killing frost in the spring and the first in the fall will vary greatly depending on location within the United States. Along the Gulf of Mexico and in certain areas of Arizona and California, the average growing season is in excess of eight months.

In contrast, northern portions of Maine and Minnesota have as little as three and a half months of growing season. Obviously, the longer the length of growing season, the greater the amount of nitrogen needed to maintain turfgrass quality.

Because the **level of quality** desired is subject to human interpretation, the rate of fertilization can be tailored to meet the expectations of the user. A home lawn maintained for aesthetic purposes, for example, can range from a weed-free turf of acceptable color and density to a season-long turf of premium appearance.

The **purpose** for which the turf is used, whether it be for an aesthetic or recreational function, will also influence the nitrogen fertility level. The rate of fertilization of bentgrass, for instance, can vary from four to ten pounds of nitrogen per 1,000 square feet. Lower rates may be used to provide a pleasing appearance on a home lawn while higher rates may be applied to maximize the playability on the golf course putting green.

Turfgrass species and cultivars can vary in amount of nitrogen required to maximize quality. Within the cool-season grasses, sheeps, hard and red fescues require a low level, Kentucky bluegrass a medium level, and bentgrass a high level of fertility. Improved cultivars of bermudagrass will require more nitrogen than common bermuda.

Cultural practices such as irrigation and clipping removal may require the use of higher annual nitrogen rates to maintain the desired turfgrass quality. Supplemental watering of turfgrasses will increase the rate at which nitrogen is leached from the turfgrass root zone. Losses of nitrogen are substantial particularly

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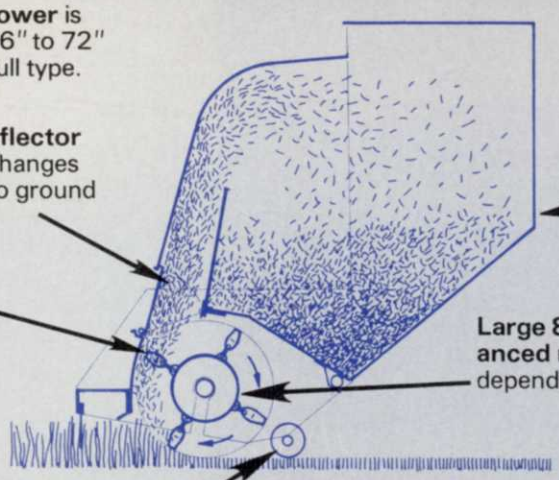

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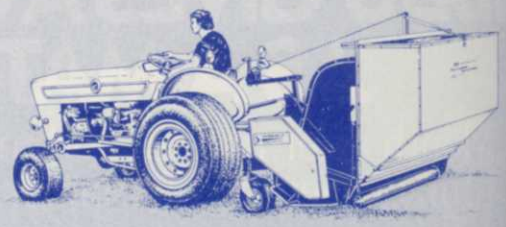

Circle No. 125 on Reader Inquiry Card

Annual Nitrogen Requirement of Turfgrasses*

Species	Length of Growing Season	Nitrogen per Season lbs./ 1,000 sq. ft.	Variations in Management
Cool-Season:			
sheeps & hard fescue	4- 8	0- 3	low maintenance; roughs
red fescues	4- 8	1- 3	low maintenance to good care
Kentucky bluegrass	5-12	2- 8	lawns, fairways
bentgrasses	4- 8	1- 4	medium care, lawn, fairways
bentgrass, greens	5-12	6-15	clippings removed, forced growth
Warm-Season:			
zoysia	6-10	1- 6	adequate cover
common bermuda	7-12	2- 8	most variable
St. Augustine, Bahia	10-12	2- 8	warm areas, lawns
bermudagrass, fairways and tees	5-12	4- 9	good management
bermudagrass, greens	8-12	8-20	may rest over winter

* Adapted from Turf Managers' Handbook by William H. Daniel and Raymond P. Freeborg, published in 1973 by Harvest Publishing Company, New York, NY.

when quick-release sources of nitrogen are applied to soils high in sand content.

Collection of clippings following mowing has been estimated to remove approximately 20% of the nitrogen applied to turfgrass. Should clippings be routinely removed from turf, as on a golf course green, additional nitrogen should be factored into the yearly total.

Phosphorus and potassium have been routinely applied along with nitrogen using fertilizer with ratios such as 3:1:2, 5:1:2 or 4:1:1. These ratios are based on the relative amounts of nitrogen, phosphorus and potassium found in turfgrass clippings but do not take into consideration the inherent levels found in the soil.

Rather than applying phosphorus and potassium each time nitrogen is applied, there use should be based on a **soil test**. The importance of determining inherent soil levels is exemplified when considering phosphorus application. Since many turfgrass soils contain high levels of phosphorus, little if any response is obtained when phosphorus is applied to established turf.

Two factors to be considered in making individual nitrogen applications are the nitrogen source used and the time of year. Applications using **quick-release** sources of nitrogen are commonly limited to no more then one pound of nitrogen per 1,000 square feet. This rule of thumb is observed in spring and fall to avoid overstimulating shoot growth. Likewise, summer fertilizer applications using quick-release sources are frequently limited to no more than one-half pound of nitrogen per 1,000 square feet. Lower rates of quick-release nitrogen sources will also minimize the potential to cause fertilizer burn.

In contrast, applications of nitrogen using **controlled-release** sources are generally made at rates from one to three pounds of nitrogen per 1,000 square feet. The longer residual of controlled-release nitrogen sources reduces the need for more frequent applications required when using quick-release sources. The need for less frequent applications is particularly desirable for turfgrass managers with labor and time restraints.

Method of application

Fertilizers can be applied in either dry

or liquid forms. The choice of using either dry or liquid application equipment has been the subject of great controversy particularly in the lawn care industry.

Research has shown, however, that turf response is equal regardless of the method of application when considering a source of nitrogen such as urea. The choice of application method, then, may be decided on the turf manager's perception of productivity and personal preference.

Two types of spreaders are used to apply **granular** (dry) fertilizers; the gravity and the centrifugal. With the **gravity** (or drop) spreader, fertilizer is held in a trough and is agitated by a mixing bar connected to the wheels. The fertilizer is dropped by gravity through a series of slots to the turf below. The gravity spreader applies a defined swath of fertilizer which can avoid waste in confined turf areas.

The **centrifugal** (or broadcast) type of spreader is commonly used by commercial turf managers because the centrifugal applies a wider swath of fertilizer and can treat large areas more quickly than with the gravity spreader. The centrifugal spreader features a hopper from which the fertilizer falls from a hole (or series of holes) onto a spinning disk which propels fertilizer ahead and to the sides of the spreader.

With a liquid application method, fertilizer is either solubilized or suspended in water and sprayed on the turf. The amount of water used normally varies from 1 to 5 gallons per 1,000 square feet.

The equipment used to make **liquid** applications of fertilizer can be broadly classified into either low-pressure spray booms or high-pressure or hydraulic sprayers. Both types of sprayers feature a tank for holding the fertilizer and water, pump to build pressure so as to force the liquid from the tank to the nozzle, pressure regulator to keep the pressure at the level desired, strainers or screens to keep solids from clogging the pump (or nozzle), and nozzle(s) which deliver the spray to the turf in a particular pattern.

Low-pressure spray booms, as the name implies, are operated at low pressures, generally in the range of 15-60 pounds per square inch (psi) and deliver one gallon or less per 1,000 square feet of spray.

Low-pressure spray booms are designed to be driven over large areas delivering the spray from a series of nozzles in distinct swaths. This type of sprayer has been popularized by golf course superintendents who use it for making liquid applications to golf course fairways.

High-pressure sprayers can create spray pressure of several hundred pounds or more and use a hose and hand-held nozzle for directed applications of the spray. This type of spraying system is used by those companies in the lawn care industry who apply fertilizers using a liquid application technique.

FERTILIZATION OF TREES AND SHRUBS

Landscape trees and shrubs are often grown out of their native habitat and are subject to adverse soil and environmental conditions. Compacted soils, poor drainage, restricted root areas as well as highway salts, air pollutants and competition from turfgrass contribute to plant stress and increase the importance of regular fertilization to maintain healthy growth.

Vigorous, well-maintained trees are more resistant to many insect and disease pests, are more attractive, and are a greater asset to properties.

When trees are fertilized, only nitrogen, phosphorus and potassium are normally applied. However, supplemental micronutrients such as iron and manganese may be necessary for certain species growing in alkaline soils.

Plants generally respond to applications of nitrogen often with dramatic improvements in shoot growth and leaf color. Because of nitrogen's transitory nature in soils and the large amount extracted by plants, soil analysis is not particularly useful. Heavy applications of nitrogen alone may stimulate shoot growth more than root growth, disturbing the natural root:shoot ratio.

The need for supplemental phosphorus and potassium is more difficult to determine than for nitrogen since phosphorus and potassium normally do not produce a noticeable, visible response except on young or newly transplanted trees and shrubs. In addition, results from field studies have been inconsistent because of differences in soil, the age, condition and location of test species, and the timing and method of application.

Where reliable soil tests are not available for phosphorus and potassium, most arborists fertilize all trees and shrubs with a complete fertilizer. Since arborists are concerned with the health of individual trees and shrubs growing in a wide variety of soil conditions, the most practical approach to fertilization is to provide an effective fertilizer formulation for trees and shrubs within a market area.

Specific soil/plant deficiencies may be addressed, if necessary, on an individual basis. In most cases, a **3:1:1** or similar ratio is satisfactory for landscape plants although additional potassium and/or micronutrients may be advisable in sandy soils.

Additional micronutrients may also be necessary in alkaline soils particularly for ericaceous or other so-called "acid-loving" plants.

Iron deficiency chlorosis is common on oaks, rhododendron and pine grown on alkaline soils and has been reported on sweet gum, ginko and birch as well as many other woody ornamentals. **Manganese deficiency chlorosis**, also induced by alkaline soils, is a common problem with maples.

Application rates

Most fertilizer recommendations are based on the number of square feet in the **growing area** for shrub beds or the **branch spread** for individual trees and shrubs.

Fertilizer recommendations based on trunk diameter can result in over-fertilization and damage to plants if the root system is restricted by paved areas, foundation walls, or other obstructions in the soil.

Three pounds of actual nitrogen per 1,000 square feet per year or six pounds every other year is satisfactory to maintain the health and vigor of deciduous trees and shrubs. If leaf color, annual growth or general vigor is unacceptable, six pounds of nitrogen per 1,000 square feet may be applied annually.

Broadleaf evergreens, small shrubs, flowering trees and recently transplanted or declining trees are more sensitive to fertilizer salts and should receive only about one-half the recommended rate, particularly when quick-release fertilizers are applied. The risk of injury to sensitive plants may be reduced by splitting the recommended amount into two or more applications.

The amount of fertilizer to be applied per 1,000 square feet of root areas can be calculated by dividing the percent nitrogen on the fertilizer bag into the desired nitrogen per 1,000 square feet. For example, to determine the amount of 30-1-10 fertilizer required to apply six pounds of nitrogen per 1,000 square feet, divide .30

into 6, which equals 20 pounds (.30/6 = 20).

Application timing

Although the roots of woody plants may elongate throughout the growing season, active root growth most often occurs in early spring and late fall when soil temperatures are relatively cool and there is little competition from leaves for water and nutrients.

Fertilization is most effective when supplemental nutrients are available during these periods of optimum root growth. Soluble nitrogen fertilizers, because of their short residual in soils, should be applied between October and December and/or between February and April. Controlled-release nitrogen ensures availability in the root zone for a relatively long period, depending upon the solubility of the nitrogen source. The application timing of these fertilizers may not be a major concern.

Application techniques

Supplemental nutrients can be supplied to landscape plants through foliar sprays, trunk injections or applications on or beneath the soil surface. Though each method has advantages in specific situations, woody plants in most cases respond best to soil applications.

Surface applications—Nitrogen fertilizers can be applied to the soil surface since nitrates are highly mobile in soil solution and will move downward into the root zone. However, since turfgrasses within the application zone may be injured or respond with undesirable succulent growth, trees and shrubs in quality lawns normally are fertilized with subsurface applications, either placed in vertical holes or injected below the soil surface.

When fertilizing woody plants in sodded areas, surface application should be limited to no more than three pounds of nitrogen per 1,000 square feet from a controlled-release source.

Fertilizer containing phosphorus should not be applied to the soil surface. Phosphorus is bound tightly to soil particles and does not move downward to contact the absorbing roots. Surface applications of phosphorus may also stimulate annual bluegrass which is undesirable in home lawns.

Drill hole technique—Fertilizer can be placed in the root zone by drilling holes in the ground and dividing the recommended amount of fertilizer equally among the holes. For trees, the holes should be drilled 12-18 inches deep and 18-24 inches apart, beginning 2 to 3 feet from the trunk and extending two to three feet beyond the drip line.

To prevent turfgrass injury, the fertilizer level should be at least 4 inches below the soil surface. Calcined clay, perlite or other soil amendments can be used to fill the top of the hole or, in quality lawns, a plug of grass can be removed before drilling and replaced after adding fertilizer.

Soil Injection—Liquid soil injection is a fast, economical alternative to the drill hole technique for applying nutrients within the root zone. The injection equipment consists of a hydraulic sprayer operated at 150-200 psi and an injector probe that inserts

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about 12 inches into the soil. The injections are normally in a grid pattern about 3 feet apart within and slightly beyond the tree canopy.

Soil injection provides more thorough nutrient distribution than the vertical hole technique and generally can be done in about one-fourth the time. Unfortunately, most soluble fertilizers have a relatively high burn potential and soluble nitrogen may be rapidly leached from the root zone. The actual amount of soluble fertilizer applied is often less than one pound nitrogen per 1,000 square feet because of factors such as drought and decline which increase the sensitivity of plants to fertilizer salts.

After application, soluble nitrogen may remain in the root zone for as little as six weeks, further reducing the amount of nitrogen available for absorption.

Because of the limitations of liquid soluble fertilizers, suspension fertilizers are rapidly gaining acceptance for soil injection. Ureaformaldehyde is particularly effective as a controlled-release nitrogen source in spraying systems since the release rate is not greatly affected by particle size. Suspended in water, powdered ureaformaldehyde can be injected into the soil and dispersed laterally by hydraulic pressure.

At least 60% of the total nitrogen in ureaformaldehyde is water insoluble and becomes available over a one- to two-year period. Since the nitrogen salts are released gradually as the compounds degrade, ureaformaldehyde has a significantly lower burn potential than soluble nitrogen sources and can safely supply the recommended annual rate of three to six pounds of nitrogen per 1,000 square feet in a single application.

Soluble methylol and methylene ureas recently been introduced have a lower burn potential than urea or other soluble nitrogen sources. But their release characteristics and usefulness in tree care have yet to be determined.

Other methods

■ The aero-fertil technique injects dry fertilizer by blasts of air into holes which have been previously drilled in the soil. This method is similar to drill hole application and provides additional aeration by fracturing heavy or compacted soils.

■ Fertilizer stakes or spikes are driven into the ground at intervals beneath the drip line of trees and shrubs. Although they contain satisfactory

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fertilizer materials, spikes are expensive and not as effective as other fertilization methods. One or two spikes per inch of trunk diameter provide only a small amount of fertilizer, very little of which comes in contact with the root system since very little lateral distribution occurs within the root zone of most soils.

Foliage sprays and trunk injections and implants can supply a limited amount of nutrients to woody plants and are recommended for micronutrients whose availability is reduced by alkaline soil conditions. These methods are most effective when a single micronutrient is deficient.

FERTILIZATION OF TREES AND SHRUBS IN CONTAINERS

The growing of trees and shrubs in landscape containers is becoming more common in locations where plants are desirable but suitable planting sites are limited.

Container-grown plants need more careful attention to maintain proper growth than landscape plants because the reservoir of available growing media, minerals and water is much smaller. In addition, the shallowness of many containers often results in soil conditions that are too wet and poorly aerated for plant growth, particularly when the soil has not been properly prepared.

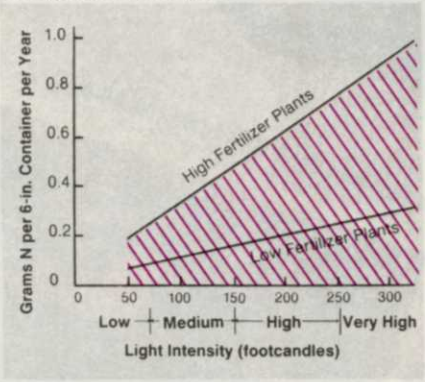
Container soils are subject to excessive leaching and require that a regular fertilization program be followed. In general, recommended **fertilizer rates** for landscape plants based on square footage have been successful in maintaining container-grown plants.

A complete fertilizer applied at an annual rate of 0.5 to 1 ounce of nitrogen per 10 square feet of container soil surface is commonly used. However, because of the wide selection in plant material, and variations in container design and growing media, fertilizer requirements are best determined through soil and tissue analysis.

Container fertilization includes dry, foliar and liquid application. Each may be used successfully with proper management. As with landscape plants, **foliar applications** are usually limited to micronutrients. Foliar fertilization should be considered where soil conditions may inhibit root absorption or where a quick response is desirable. Care should be taken to contain the spray since some micronutrient sources have staining properties.

Dry fertilizers may be applied effectively either in controlled-release or quick-release form. High analysis fertilizers may be difficult to evenly distribute because of the small amount required per container. Liquid applications of soluble or suspension fertilizers provide a uniform dosage and fast and easy distribution. Soluble fertilizers, however, will require more frequent applications due to the ease with which these materials may be leached from container media.

Suggested Fertilizer Rates for Plants in Interior Landscapes



FERTILIZING INTERIOR PLANTS

During the production phase, foliage plants are encouraged to grow as quickly as possible, utilizing considerable quantities of nutrients. These same plants grown indoors, however, are normally subjected to much lower light levels, and neither require nor will tolerate the levels of fertilizer typical in production.

Precise fertilizer requirements are difficult to predict in interiorscape maintenance without measuring the **light intensity** at strategic locations. The light level can vary significantly from one side of a room to another side, often within a distance of a few feet. In general, the stronger the light under which foliage plants are growing, the greater the amount of nutrients needed to meet the requirements for growth.

Recommended annual fertilizer rates can vary from as low as 0.3 grams of nitrogen per square foot for low light intensities to 3.0 grams of nitrogen per square foot for very high intensities.

A complete fertilizer with a nitrogen:phosphorus:potassium ratio similar to those recommended for landscape plants is suitable for indoor plants. The highest levels of nutrients should be coordinated with optimum growth periods. For most plants, this is during the spring and summer months, especially when natural light is the primary light source.

Micronutrients are seldom recommended but may be necessary when growing sensitive plants in soilless media. The rubber plant (*Ficus elastica* 'Decora') and the Areca palm (*Chrysalidacarpus lutescens*) are both sensitive to boron deficiency. In addition, the Areca palm reportedly is sensitive to zinc deficiency.

Care must be taken when applying micronutrients. Overapplications can quickly cause toxicity problems.

In addition to light levels, the proper amount of nutrients is determined by **plant species**. Plants which normally are grown under low levels of fertility include many ferns and fleshy plants such as Peperomia. High nutrient-requiring plants include rapid growing species and large-leaved plants such as Ficus and Schefflera.

A build up of salts, both from fertilizer and irrigation water, is possible unless the root area is periodically flushed with excess water which is allowed to drain away. This is particularly true when plants are over-fertilized during periods of low light and/or little growth.

Since visual symptoms such as stem rot and leaf necrosis in new growth are similar to those of overwatering, the soluble salts of the soil should be tested for confirmation.

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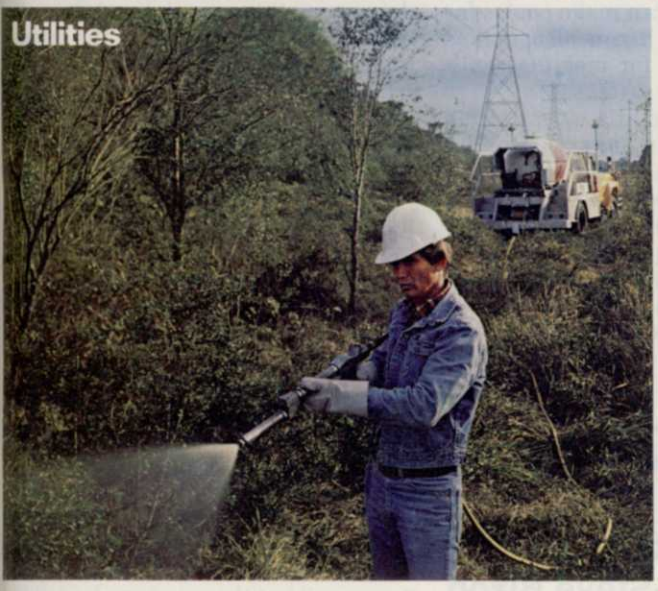

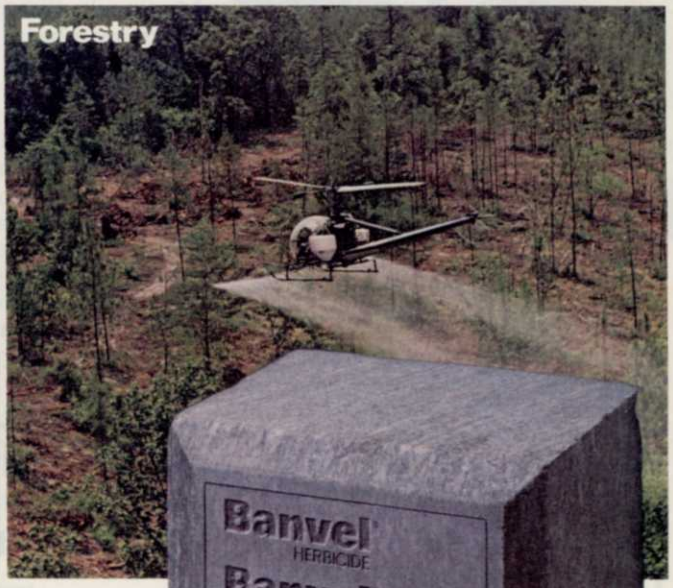

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wants Bizon Maintenance to project.

His employees (there are 10 in addition to younger brother Phillip and himself) are fully uniformed with green pants and brown shirts, his company trucks are gloss white Chevy pickups with matching trailers, and his mowing equipment gets a thorough washing at the end of each work day.

Charbonneau Greens *Town Homes association chairman Robert Martin, Phil Bizon and Steve Bizon.*

Even his literature gets that extra touch because when he submits a bid he wants the first impression to count. The bid cover is glossy and displays his company logo in three colors.

"When we do something, we want to do it first class," Bizon stresses. "I don't mind spending an extra dollar, because sometimes it can make something look a thousand times better. That's the way we want to look and the way we operate."

So far the Charbonneau Greens Town Homes association, through its chairman Robert Martin, is responsive to Bizon's suggestions without dealing him carte blanche.

"Steve is doing a marvelous job," Martin says, "otherwise we'd be having a lot of meetings. We seldom have a board meeting now."

But, when it comes to approving all of Bizon's projects. . .?

"He tries to get a little bit extra all the time, but we're a small association and we can't always give him what he wants," Martin adds.

Even so, the condo board (pleased because it doesn't have all those stuffy meetings) and Bizon interact amicably.

Strictly business

Bizon feels the main reason is that he treats condominium maintenance much like he treats his commercial accounts.

"We insist we deal strictly with one person and not with an entire board. In the past a lot of people didn't like dealing with condominiums because there are so many different personalities to deal with. If we have to listen to everybody pretty soon our workers are listening to complaints rather than getting their work done. It's always better to have one person to deal with and that way that person can speak for the whole group."

Bizon realizes he has to bend a little, too, when dealing with a condominium board and he does by providing a written monthly report to Martin who then can make copies for board members. Bizon also makes himself available for meetings with the board.

But, it's been his company's aggressiveness in jazzing up the condo grounds that got the relationship off to a good start.

Shortly after earning the contract, Bizon initiated improvements to the lawn irrigation system. Water from the Willamette River is used in keeping lawns lush and green, but in the summer the water often carries debris which clogs lines and sprinkler heads. Bizon Maintenance installed filters in both the in-coming mains then put in 1,000 new Toro 570 pop-up sprinkler heads with built in filters.

"I felt no job could pay me what I was worth."
—Steve Bizon

Bizon also decided to use only reel mowers on the Charbonneau property, Toro Triplex mowers which he ingeniously converted from riding to walk behinds for more manueverability. He made the conversion by removing the mower seats and installing handlebars. Bizon says reel mowers give the grounds a neater look and also help reduce thatch build up.

With more reliable irrigation and mowing schedules the Charbonneau grounds quickly showed improvement.

The agreement between the board and Bizon stipulates the grounds are to be mowed 38 times, fertilized six times, and sprayed for broadleaf weed control two times annually.

Self-starter

Bizon launched other projects to make noticeable improvements and earn valuable points with the board.

He started an extensive pruning project, then attacked the two traffic islands that had been allowed to grow shabby, tearing out much of the old planting and replacing it with pink and red geraniums, white azaleas, and red rhododendrons.

The colorful flower beds are a calling card for Bizon who goes into almost every job with the idea of doing something special and doing it quickly. Soon after landing the maintenance contract for O'Mark Industries in Portland, Bizon's company planted 3,000 bulbs which, when they flowered the following spring, made a sparkling display.

Bizon isn't afraid to begin tasks that may not show results for several months or even a year because he insists on a two-year contract from all his accounts.

"I'll do more for my customer this year knowing that I'll have that same customer again next year," he says. To provide his company with a winter cash flow and also as a convenience to his customers, billing is divided into 24 equal payments.

After only five years in business it's perhaps a bit early to be burdening Bizon Maintenance with the stamp of "success," but the company is visible and aggressive. And it is growing.

This is due in large part to the moxie of its owner who quit a job building components for nuclear plants to start his own business.

Bashfulness isn't one of his vices. "I felt no job could pay me what I was worth," he says candidly.

With an initial investment of $5,000 he bought a Chevy pickup, three push mowers (two Snappers and one Tru-Cut reel mower), an edger, and a backpack blower.

He was in business.

His first accounts were residential, but it didn't take Bizon long to start pushing for the commerical accounts and the pieces started falling into place. He left the residential market altogether and now brother Phillip, 24, helps share the business load.

"People didn't take good maintenance seriously a few years ago. They thought landscape first and maintenance second. Maybe it's because nobody ever showed them what good service is," Bizon says. **WT&T**

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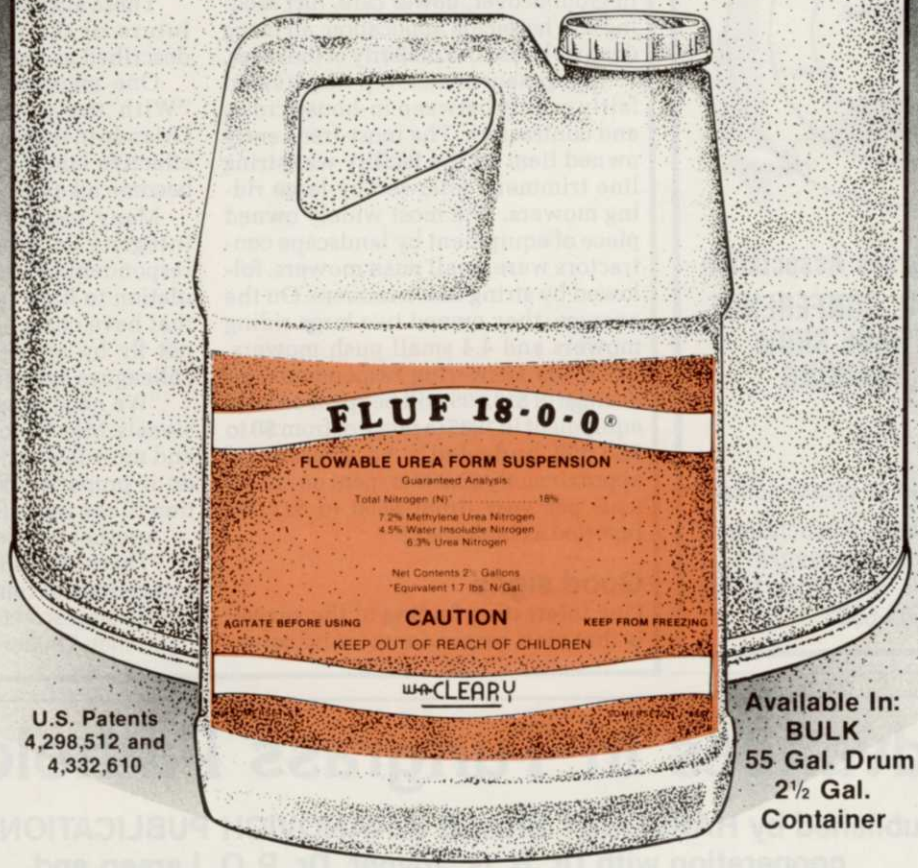

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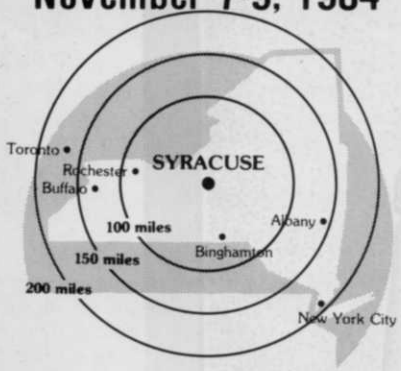

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SURVEY *from page 22*

Balancing the scales

Services such as mowing, trimming, fertilizer application, tree trimming spraying, seeding, were evenly divided between in-house crew and subcontractors.The largest variances were in groundcover, flower care, turf seeding and herbicide application; all being done in-house in a majority of the cases.

Equipment ownership was divided fairly evenly between in-house crews and contractors. The most-frequently owned item by the facility was string line trimmers, followed by large riding mowers. The most widely owned piece of equipment by landscape contractors were small push mowers, followed by string line trimmers. On the average, they owned two large riding mowers and 4.4 small push mowers.

Of the answering respondents, an average of $18,695 will be spent on new equipment in 1985 (a range of from $0 to $50,000 budgeted). An average of approximately $5,000 is spent on chemicals per year (from $500 to $12,000 reported as budgeted.)

Good signs

One interesting finding of the survey is that most respondents found condo owner associations *do* appreciate the difference between professional quality maintenance and less professional, seasonal bidders. There is also little decrease in interest and budget by owners after the units are sold.

These answers all bode well for the future of the industry which most described as excellent.

One manager from Orlando said, "With the tremendous growth in Orlando in the next three to five years, effective landscape maintenance will become a key element."

Many, too, are concerned about the integrity of their profession. One respondent felt there needs to be "regulation to limit participation to those that have chosen this as a profession, not fly by nighters." Another of his colleagues agreed.

"We need properly trained professionals. Many people can prune plants and mow lawns, but not many people do it properly. What about certification in the industry?"

Another was more pragmatic.

"There seems to be more and more competition as time goes on, but I think I'm the biggest factor. If I don't do my job right, then I better worry." **WT&T**

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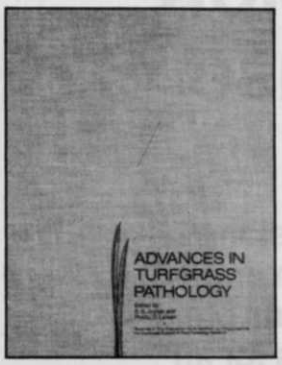

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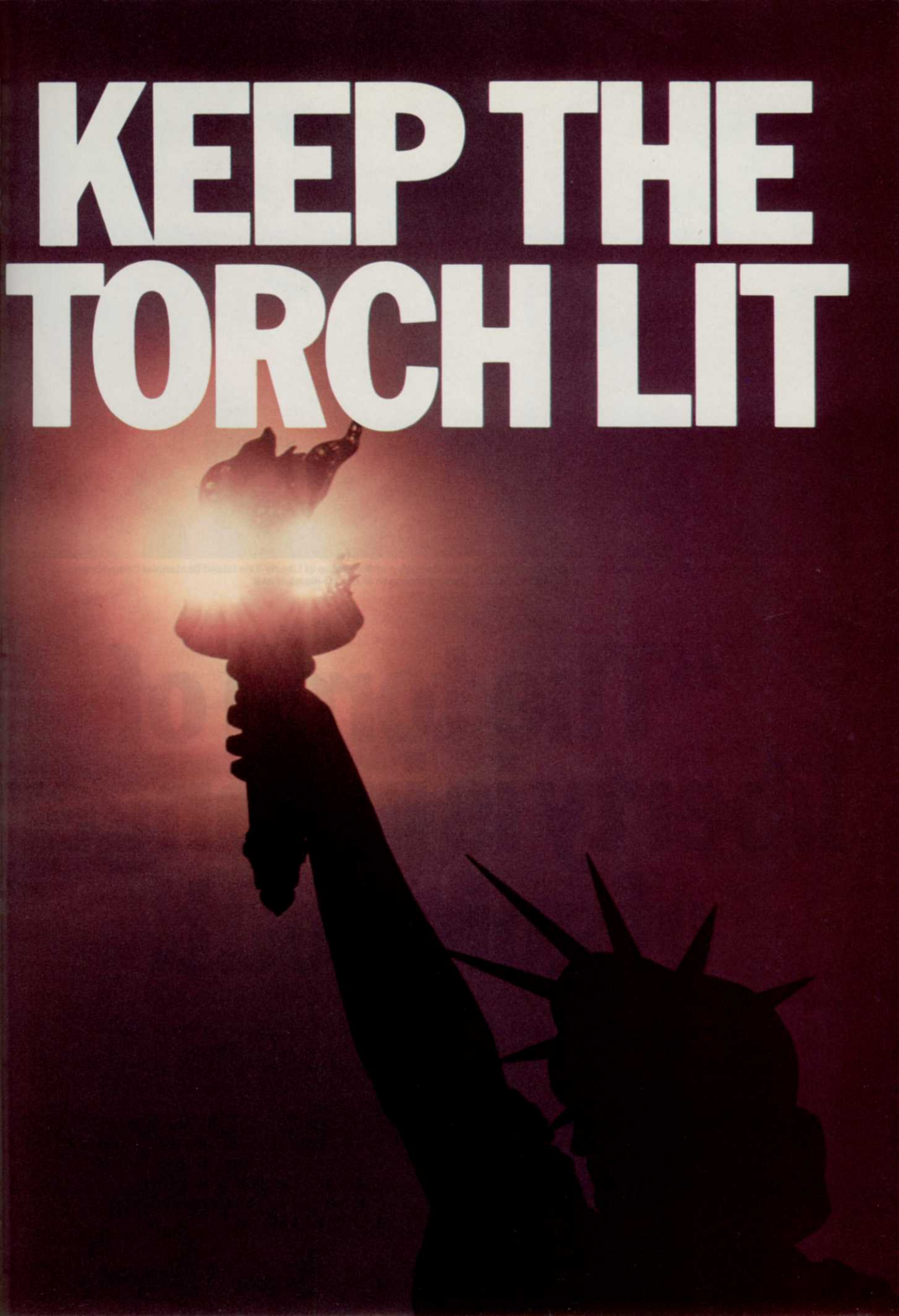

On May 18, 1982, President Ronald Reagan announced the formation of the Statue of Liberty-Ellis Island Centennial Commission and appointed Lee A. Iacocca chairman of the 20-member unit.

"The torch of liberty is in danger of going out."

"Restoration of the Statue of Liberty and Ellis Island is of vital concern to all Americans. The loss of these two landmarks in America's heritage would be a tragedy. But our allowing it to happen would signify an even greater loss in our national spirit.

"That's why I'm delighted that Lee Iacocca has taken on the job of Chairman of the Centennial Commission. His parents were among the 17 million who passed through the Immigration Center and went on to help build our country. Their determination to take responsibility for their own destiny is a heritage all Americans should be proud to keep alive today.

"I know Lee and his commission will do a tremendous job. The initial response to their appeal to business leaders and the public has been wonderful. Now it's time for every American to join in."

Ronald Reagan

The Statue of Liberty, best known symbol of freedom in the world, is every American's to cherish.

A century of fatigue and corrosion has weakened the Statue's frame, eaten holes in the copper skin.

Photos courtesy of Peter B. Kaplan

Ellis Island, where people full of hope stopped being foreigners and started being Americans.

For nearly a hundred years, the Statue of Liberty has stood on the edge of the New World, America's most powerful symbol of freedom and hope. Today the ravages of almost a century of weather and salt air have left their marks. Corrosion has eaten away at the iron framework. New holes continue to appear in the copper sheets that form the exterior.

Less than a mile away, on Ellis Island where the ancestors of nearly half of all Americans first stepped onto American soil, the Great Hall of the Immigration Center is a hollow ruin. Rooms are vandalized, passageways overgrown with vegetation, walls crumbling in decay.

Inspiring plans have been developed to restore the Statue. On Ellis Island, a permanent museum will be established devoted to the history of the island itself and celebrating America's immigrants on both coasts; the diversity of their ethnic origins, the magnitude of their contributions to our nation. But unless restoration is begun now, these two landmarks in our nation's heritage could be closed at the very time America is celebrating their hundredth anniversaries. Sections of the Statue have already been declared unsafe and closed to visitors. The 230 million dollars needed to carry out the work is needed now.

All of the money must come from private donations; the federal government is not raising the funds. This is consistent with the Statue's origins. The French people paid for its creation themselves. And America's businesses spearheaded the public contributions that were needed for its construction and for the pedestal.

The torch of liberty is everyone's to cherish. Could we hold up our heads as Americans if we allowed the time to come when she can no longer hold up hers?

A copy of the last financial report filed with the Department of State may be obtained by writing to: New York State, Department of State, Office of Charities Regulation, Albany, New York 12231, or the Statue of Liberty-Ellis Island Foundation, 101 Park Avenue, 12th Floor, New York, N.Y. 10178.

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Initial response from corporations to the centennial fund-raising campaign is well under way. Companies such as Chateau Ste. Michelle Winery, Coca-Cola, Kellogg's, Stroh's, U.S. Tobacco, Oscar-Mayer, Kodak, USA Today, Nestle and The Chrysler-Plymouth and Dodge Dealers are already behind the project. To learn more about the advantages of corporate sponsorship and how to set up employee fund-raising programs during the nationwide promotions surrounding the restoration project, write on your letterhead to: Liberty, 101 Park Avenue, New York, New York 10178.

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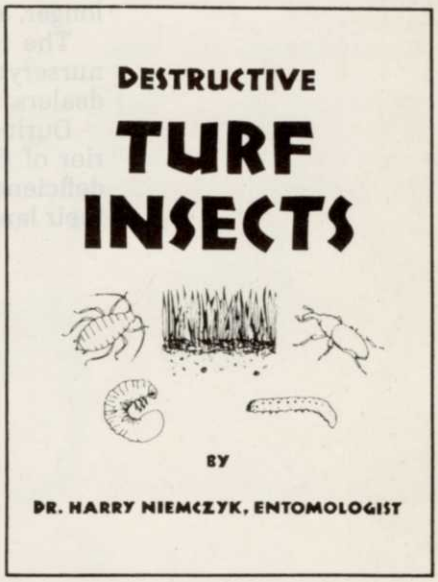

Destructive Turf Insects by Dr. Harry Niemczyk covers pests of warm and cool season grasses and contains over 130 color photos. Included is a color photo guide to identifying insects and mites that inhabit the soil, thatch, leaves and stems.

Circle No. 142 on Reader Inquiry Card

The Relandscaping of America

A renewal of the suburban residential landscape is taking place. Landscape professionals can profit from opportunities arising from the relandscaping of America.

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Because large-scale suburban landscaping was something new, many homeowners did their own. They planted shrubs too close together and selected poor varieties of trees and grass. Today, you find the original shrubbery overgrown, the trees too large or misplaced, and shade or thatch taking their toll on lawns.

A recent survey of lawn and garden do-it-yourselfers found almost half live in homes that are 25-years-old or older. Seventy-five percent have homes older than eight years. Most do-it-yourselfers are more than 35-years-old.

Many of the original owners (21%) moved up to bigger houses on larger lots in the 1960's and early 1970's. That percentage has fallen to 17 percent in the 80's. Homeowners are keeping their homes longer.

Polls have revealed two things, that homebuyers concentrate more on the inside of their house for the first five years, and the longer they stay put, the more apt they are to start lawn and garden projects.

The U.S. population is getting older, homeowners are keeping their homes longer, and landscape mistakes made earlier must be corrected.

The result is the Relandscaping of America. It provides opportunities for nurserymen, landscapers, lawn care operators, and outdoor power equipment dealers.

During the 1980's and 1990's homeowners will be concentrating on the exterior of their homes, they will need advice and service to correct landscape deficiencies, and they will be old enough and wealthy enough to pay to have their landscapes done right....the second time around.

by Mark Rostvold, director of consumer products marketing, Deere & Company, Moline, IL

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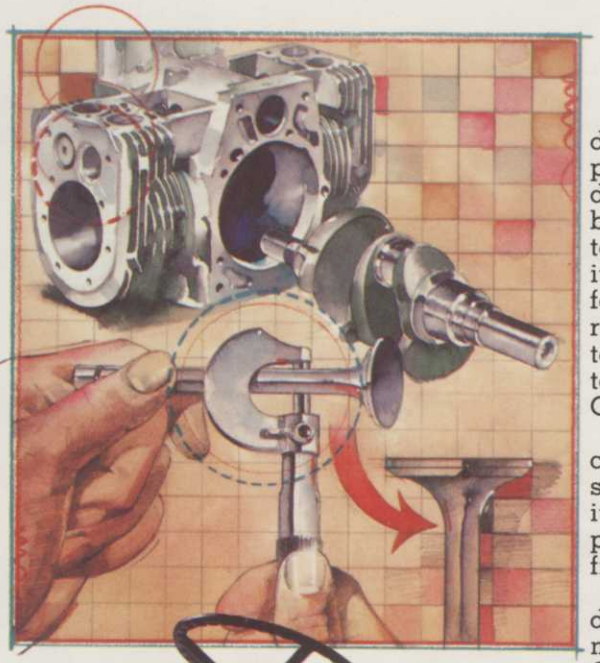
OUR GROUNDSMASTER® 62. WE PICKED ITS ENGINE APART.



BECAUSE WE'RE PICKY ABOUT POWER.

When Toro develops a riding rotary mower, you can be sure it's engineered to keep you cutting.

Because, for one thing, we never forget that engineering begins with *engine*. Picking exactly the right power to match width of cut and kinds of attachments.

Too much power wastes fuel and is inefficient. Too little power stunts productivity and works the engine to death.

So we've powered our Toro Groundsmaster® 62 with an Onan 20 hp, twin cylinder engine. But only after considering 10 excellent candidates, narrowing them down to 3 for testing, then literally picking apart our final choice.

We tested it on a dynamometer to verify its power rating. We tore it down and inspected it part by part for durability. We tested it for noise. We tested it for vibration. We tested it for fuel economy. Then, we ran it hard for 1,000 hours to make sure it was up to going to work for our Groundsmaster 62. And you.

And, to keep you cutting, we evaluated its serviceability, too. Made sure its routine maintenance points and replaceable oil filter are easy to get to.

Call your Toro distributor. He'll tell you more about our Groundsmaster 62. The high capacity 62" professional now teamed with our Groundsmaster 52® and gas and diesel Groundsmaster 72s® to offer you a complete line of riding rotaries.

TORO®

THE PROFESSIONALS THAT KEEP YOU CUTTING.

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Prelude

The "all-purpose" Perennial Ryegrass

Golf courses, home lawns, athletic fields, parks, school campuses, racetracks or cemeteries . . . anywhere you need a perennial ryegrass, you'll get top performance from Prelude.

Check the latest university reports. North and South, Prelude has been taking high honors for overall turf performance in trials against other turf-type perennial ryes. Prelude consistently outperforms such popular varieties as Pennfine, Derby and Manhattan.

In fact, Prelude has performed so well that it's now recommended for use on PGA TOUR™ golf courses. And that's quite an endorsement, because Dennis Leger, PGA TOUR Agronomist, is one of the most demanding turfgrass specialists in the industry.

Whether you're establishing a new lawn, or overseeding existing turf, try Prelude perennial ryegrass. You'll get a thick, lush, dark green cover that establishes easily and quickly while standing up to heat, drought, and disease. If traffic is your concern, Prelude recovers quickly after being abused by golf carts, or the wear and tear of a football game. Prelude turf-type perennial ryegrass: a top performer for all uses.

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PGA TOUR

Endorsed by the PGA TOUR™

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